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This Week

There are two events of more than usual interest that have made history. On page 540 there is a story of the SAE Aircraft Production Meeting. It was big time and the account is liberally illustrated. By all means read it.

Then on page 548 there is an account of another record breaker, The Metals Congress and Exposition. It will pay you to read that too.

On pages 550 and 554 are descriptions of the new Hudson-Terraplane and the Nash-Lafayette lines respectively. The story of the 1937 Plymouths begins on page 531.

Dealers Get Sample Cars

New Models Will Be Available in Most Cities Before N. Y. Show; Used Car Stocks Half Normal

By Harold E. Gronseth

Motor companies are approaching the new sales year with their dealers in the best inventory position they have enjoyed in many years. An unusually thorough clean-up of old models has been achieved. Used car stocks are reasonably low and most dealers will be fairly well sampled with 1937 cars when the new models are introduced.

By the time the 1937 season officially opens Nov. 11 the majority should be in position to make deliveries in substantial volume. Chevrolet dealers, who are in about as favorable a position as

any in the industry, average less than one 1936 model each and used car stocks are down to about half of the normal number carried just prior to display of new models. The 1936 car stocks of other leading dealer organizations either have reached or are approaching similar status and used car inventories, which may not be quite low, are in most cases regarded as quite satisfactory.

Retail sales are now reflecting the exhausted condition of field stocks during the period between old and new models, and it is not unlikely that sales during the current month, will fall below the corresponding month of 1935. This is entirely due to the sold-out condition of dealers in 1935 models before announcement of the new lines. There is no evidence of recession in demand, for wherever new models have been put on sale they have met with strong demand and deliveries have jumped to higher levels than a year ago. Supply is likely to be the only limiting factor on sales all through the final quarter this year.

September deliveries in the domestic retail market are estimated to have

(Turn to page 537, please)

Nash-Kelvinator Merger

**Manufacturing Economies Seen as One Advantage of Combination;
No New Financing as Both Have Big Cash Reserves**

Merger negotiations between the Nash Motors Co. and the Kelvinator Corp. are under way in Detroit, with announcement of terms expected to be made shortly, it was reported this week. C. H. Bliss, vice-president and director of sales of the Nash Motors Co., informed a representative of AUTOMOTIVE INDUSTRIES that the reports as published are substantially correct. The combination would create another major motor-refrigeration-air conditioning unit. General Motors and Chrysler Corp. are already in the field.

The merger would enable the metal working divisions of the two companies to function as a unit, reducing the costs of production by permitting steadier operations and buying of materials in larger volume.

According to reports, exchanges of stock would result in the eventual issuance of shares of a new company. It was regarded as probable that the new company would be an operating concern, to avoid present tax disadvantages which a holding company would have. No new financing was expected in

financial quarters since both companies have big cash and security reserves.

Latest earnings statements show that Kelvinator for the June quarter earned \$893,397 or 77 cents a share. Its fiscal year ended Sept. 30. The Nash company has but recently reported net income for the August quarter of \$177,249 or 7 cents a share. Nash Motors' fiscal year ends Nov. 30. The company has upward of \$25,000,000 in cash and securities. Kelvinator has about \$3,500,000 in cash and securities.

Nash plants are located at Racine and Kenosha, Wis. Those of the Kelvinator Corp. are at Detroit.

Reports also indicated that the change would be the occasion for the retirement from active business of C. W. Nash who for years has headed the Nash company and now fills the post of chairman of the board. Nash's president, E. H. McCarty, announced recently that he is resigning that post at the close of the fiscal year. George W. Mason, chairman and president of Kelvinator, was mentioned as the likely head of the combined companies.

Austin Invades U.S.

**Sir Herbert Sees Market Here
for 5000 Baby Cars**

"Fifteen low-powered automobiles, forerunners of a fleet of 10,000 which will be brought to America from England within the next year, arrived today on the Manchester Brigade."

This dispatch, under a Baltimore date-line of Oct. 15, caused wide speculation in automotive circles. How could a foreign-built car compete in price or quality with the American product, even if there were no tariff to raise costs? How could a foreign manufacturer, without a dealer organization here, hope to sell 10,000 units the first year? Would a car with right-hand

(Turn to page 537, please)

Diamond T Announces Diesels

*Model D20, 1½-3 Tons, and Model D30, 2¼-4 Tons,
to be Powered by Hercules Diesel Engines*

Diamond T Motor Car Co. will have two new Diesel truck models among its exhibits at the coming Chicago automobile show. These are the Model D20, of 1½-3 tons capacity, and the Model D30, of 2¼-4 tons capacity. The former has a chassis base price of \$2,150, the latter of \$2,750. Gross-weight ratings are 13,000 and 17,000 lb. respectively.

Hercules engines are used in both models. The smaller chassis is equipped with a six-cylinder 3½ by 4½-in. engine (260 cu. in.) developing a maximum torque of 178 lb.-ft. and a maximum output of 77 hp. at 2600 r.p.m., while the larger one has a six-cylinder 3¾ by 4½-in. engine (298 cu. in.) developing a maximum torque of 208 lb.-ft. and a maximum output of 86 hp. at 2600 r.p.m.

The Bosch injection system is employed, with plunger-type fuel pump, pintle-type nozzles, and vacuum governor. An oil-bath air cleaner and a recirculating type thermostatic valve are standard equipment. Rubber engine mountings are provided to absorb engine vibrations.

Both models have full-floating, two-speed rear axles. In the D20 the rear axle ratio is 5.14 in the high range and 7.15 in low. For the model D30

two combinations of ratios are available. The fast axle gives a reduction of 5.62 in the high range, with exceptional fuel economy and a top speed of approximately 48 m.p.h., and a reduction of 7.65 in the low range, providing much greater pulling power for grades or soft roads. The slower axle offers a reduction of 6.43 with a top speed of 42 m.p.h. combined with a ratio of 8.74 for use under severe conditions.

London Colors Lighter

*Coronation Influence Seen in
Brighter Tones at Olympia*

The general trend toward lighter colors, probably influenced by the coronation next year, was the most noticeable feature of the 30th International Motor Exhibition which opened in the Olympia Oct. 16, according to color experts of the Duco Color Advisory Service. There is also an increased use of chromium plating for both fittings and striping.

Black and dark blue remain the most popular colors, with gray ranking second. White and cream are increasing in popularity. Green and

maroon are only holding their position, while light blue is still less popular than in previous years. New colors introduced last year are gaining in popularity and such shades as green blue, silver gray and gray brown are used both as straight colors and as iridescent shades. Two-tone body finishes have disappeared, but the use of two contrasting colors is increasing.

FTC Groups Complaints

*Cases Against Parts Associations
Have Been Consolidated*

Giving simplification of trial as its reason, the Federal Trade Commission announced Oct. 16 that it had consolidated previous cases into one and issued a complaint against five trade associations composed of manufacturers and jobbers of automobile parts and accessories, charging them with forming a combination to control the market, and fix and maintain resale prices. Also named as respondents are the officers, directors and members of the five associations. The associations are: National Standard Parts Association, Detroit; Motor and Equipment Wholesale Association, Chicago; Automotive Trades Association of Greater Kansas City, Kansas City, Mo.; Mississippi Valley Automotive Jobbers' Association; and the Southwestern Jobbers' Association.

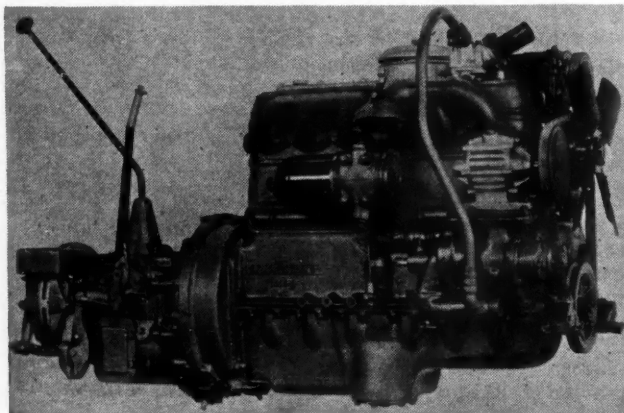
The new complaint is consequently a formality looking to simplification and expedition of the cases. New answers must be filed by the associations, but it is understood these will be merely a repetition of answers filed against the previous actions. The five associations have been given until Nov. 20 to show cause why the commission should not issue a cease and desist order, after which a date for the hearing will be set.

Hudson Officials Promoted; Offices Opened in 6 Cities

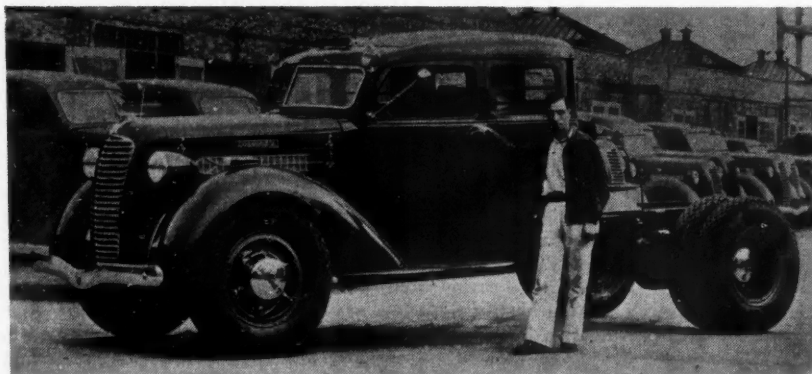
W. R. Tracy, vice-president in charge of sales of Hudson Motor Car Co., this week announced five executive promotions.

George H. Pratt, assistant general sales manager, was named sales manager; H. F. Byrne, assistant sales manager, was named eastern sales manager; H. P. Grove, formerly Pacific Coast regional manager, has been appointed western sales manager; C. G. Beeching has been appointed sales manager in charge of zones, and T. H. Stambaugh becomes director of national service operations, which includes parts and service activities and accessory merchandising.

At the same time, Mr. Tracy announced that Hudson has opened regional offices in six key cities of the country, and that the company's field organization has been increased to better serve Hudson's expanded dealer organization from coast to coast.



Right - hand view
of the Hercules
Diesel engine used
in the Diamond T
light truck.



The first Diesel-powered Diamond T, a Model D-20 tractor chassis with sleeper-cab, leaves the factory.

Union to Start Drive

UAW Membership Campaign Next Month to Be Aided by CIO

An intensive membership drive is to be launched on a wide front by the United Automobile Workers International Union during the second week of November. Mass meetings are to be held simultaneously in all the important automotive manufacturing centers on a given date, tentatively set for Nov. 13. These meetings will signalize not only the opening of the most intensive drive for members ever staged by the new union but also the entrance of the Committee for Industrial Organization into active organization work in the motor industry.

John Brophy, director of the C.I.O., second in command to John Lewis, and Philip Murray, chairman of the Steel Workers' Organizing Committee, will be the principal speakers at the central mass meeting in Detroit. At the same time, in about 30 other cities, speakers from the C.I.O., the Steel Workers' Organizing Committee, and the U.A.W. will address similar gatherings of automotive workers.

The start of the drive is timed to tie in with resumption of full-time operations by the motor industry on its 1937 manufacturing program, the union's organization work having lagged during recent weeks of reduced employment while plants were changing over to new models. There is nothing in the picture at this time to indicate any interruption to operations in the industry—no particular sore spots to be corrected—said a spokesman for the union.



European photo

Pedestrians next? An Australian motorcyclist had some original ideas as to streamlining—and did 123.2 m.p.h.

Canadian Transport Assn. Likely

Formation of a Dominion-wide transport association seems likely in the near future. The Manitoba association has suggested to the two prairies groups that a meeting be held in Winnipeg in November to discuss union, and it is likely that British Columbia will join in such a move. Ontario and Quebec associations have been discussing the matter for some time, but no actual move has been made. The next meeting of the Ontario association is slated to take place in Ottawa, Ont., very shortly and the whole matter will be discussed there. Quebec representatives will be invited to be present at the meeting.

1937 Plymouth Bodies Larger

Greater Comfort Emphasized; Hardware and Interior Fittings Engineered for Safety

Among improvements in the Plymouth for 1937 are the adoption of a hypoid-gear rear-axle drive to eliminate the tunnel in the rear compartment; an increase in body size and body mounting on rubber cushions on outriggers; the elimination of potentially dangerous projecting parts from both the outside and the inside of the bodies, in the interest of safety; the adoption of direct-acting shock absorbers; better noise and heat insulation, and improvements in the steering gear and the ventilating system.

Particular emphasis is laid on the increased size of the bodies, made possible by the outrigger mounting and a wider tread. Front seats are 3 in. wider and rear seats 2 1/4 in. The new seamless steel roof provides 1 in. more headroom without increase in car height. The overall length has been increased to 194 in. for all models.

The Plymouth line now includes three "business" and eight "deluxe" body types. All bodies are mounted on chas-

sis of 112-in. wheelbase and fitted with 82-hp. engines. All sedans now have either trunks or luggage space accessible from the back of the car. Built-in trunks have much greater capacity than last year, while in models not provided with trunks there are luggage compartments which utilize the extra space behind the back-seat cushions and provide as much room as the built-in trunks on last year's models. Spare tires are now being carried inside on all models—in coupe models behind the passenger-seat cushion.

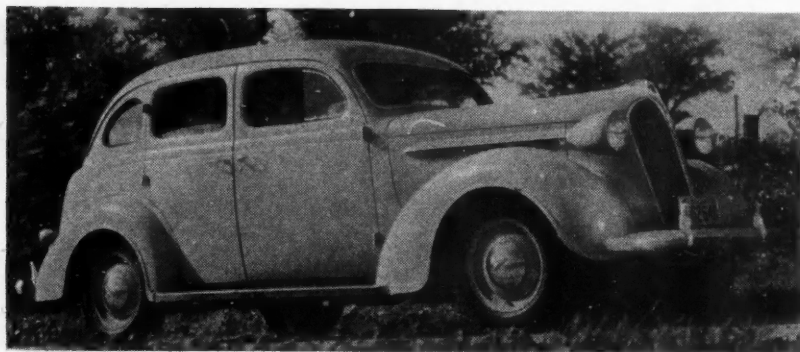
Considerable change has been made in the front-end styling. The 1937 model has a new radiator grille of simple design, with vertical bars of bright chromium on each side of the center strip, which is finished in the same color as the body. The familiar Plymouth sailing ship slants back at a more rakish angle. New, large, acorn-shaped headlamps are supported by streamlined brackets from the sides of the radiator. The hood extends from

the front edge of the radiator shell in an unbroken line. Longer, deeper hood louvers extend the whole length of the hood, in chromium-plated bars. Bodies are now fitted with seamless steel tops.

Fenders have a higher crown, dip lower in front, and flare more at the sides. The steel disk wheels are finished in body color and have larger hub caps. Deep drip moldings extend the full length of the car over all doors and windows. Defrosting or anti-frost vents are built into the bottom of the windshields in front of both driver and passenger. A headlamp-beam indicator on the light control shows when the high beam is in use. The glove compartment is larger and nearer the center of the instrument panel. Provision is made for an extra loud speaker for the rear compartment, in the back of front seats. In deluxe sedans ash trays are inserted in the arm rests. redesign of the rear-compartment foot rest has added 3 in. of leg room.

Projecting parts on the outside have been studied with a view to minimizing the hazards which they involve. Door handles now curve inward, so that they cannot catch sleeves or other parts of the clothing. The rear license plate has been moved from over the tail light to a recessed bracket at the middle of the trunk lid and is now provided with a separate lighting fixture. Even more extensive changes have been made in the interior of the bodies with a view to enhancing the safety of the cars. Starting at the front, throttle, choke and light switch are so arranged that they disappear on special slides in the rounded base of the new panel, and even the switch key is recessed. The flat panel is raised above knee height, and the windshield crank folds into the smooth, round dome.

Underneath the panel, the dash has been recessed for greater toe clearance and for safer operation of clutch and brake pedals. Windshield wiper controls are of soft rubber instead of metal. Arm rests, too, are of soft



1937 De Luxe four-door Plymouth sedan

sponge rubber. Inside door handles also curve inward, eliminating projections. Back-seat passengers are protected by a padded roll across the front seat, and a silk robe cord replaces the metal rail. Dome lights have been replaced by reading lights over the back window.

Bodies still follow the contour of the frame, but instead of being set directly on the frame, they are mounted on brackets with rubber cushions. These rubber cushions merely support the weight of the body and are not compressed by the body bolts.

Direct, double-acting shock absorbers are now fitted, and are mounted at an angle so to minimize swaying when rounding corners. As compared with the shock absorbers formerly used, the new ones have greater oil capacity and larger valves, and they work at much lower oil pressures. The trend has been increased to 60 in. In the steering mechanism, the king-pin angle has been reduced from 9 to 4 deg. This, together with a number of mechanical improvements in the steering gear is claimed to have reduced the steering effort required by 20 per cent and eliminated the tendency of the car to "wander."

Noise elimination was made the subject of a special study by Plymouth engineers, and five different insulating materials are used. Wafflex takes care of sound absorption and heat insulation in the one-piece steel roof and cowl. Cordex protects the floor, with the addition of asphalt-impregnated felt in front near the engine. Silento prevents the side panels from acting as sound boards, and deck lids are lined with a sound deadener which is sprayed on in liquid form.

Improvements in the ventilating system include "clear-vision" butterfly vanes in front-door windows of deluxe models. When the rear section of the window is lowered, vision is not obstructed by any metal moldings. Rear-quarter windows on deluxe four-door sedans also swing outward on friction pivots, the control being the same as that for the front-window vanes.

The six-cylinder L-head engine remains generally the same, but it is now fitted with U-slot pistons which are said to be quieter in operation and to have longer life; it also is equipped with a new oil filter having more filtering elements. With a com-

pression ratio of 6.7, the engine develops 82 hp. The aluminum pistons are treated by the anodic process to increase their surface hardness, and they carry four rings instead of three.

By the use of a hypoid-gear final drive the need for a propeller-shaft tunnel in the rear compartment has been eliminated. The whole chassis is now better sealed to prevent oil leakage, and there are fewer places to lubricate.

Hydraulic brakes of the type in which each shoe is actuated by a separate piston are continued, together with centrifuse brake drums and a separate parking brake acting on the propeller shaft.

All bodies, fenders and other sheet-metal parts are rust-proofed. Bodies are finished in the high-color enamel introduced last year. Standard colors available for all models include black, Plymouth blue, Middy blue, gunmetal, aquamarine and Plymouth beige.

Delco Personnel Transfers; Brake Division Independent

Alfred P. Sloan, Jr., president of General Motors Corp., announces the following organization changes, effective Nov. 1:

C. H. Kindl, now factory manager of the Delco Products Division at Dayton, Ohio, becomes general manager, succeeding Frank H. Prescott, transferred to other duties.

R. H. Ahlers remains as general manager of the Delco Brake Division at Dayton, Ohio, which will operate independently of the Delco Products Division with which it has been affiliated. The Delco Products Division manufactures shock absorbers and other parts for automobiles and electric motors for industrial use and the Delco Brake Division manufactures automobile brake assemblies for General Motors cars.

Los Angeles Race Postponed

The 500-Mile International Sweepstakes which was to have been held at the new Los Angeles Raceway Nov. 29 has been postponed until spring in order that the track may be properly conditioned.

:SLANTS:

AMERICAN PROPHECY, 1856—

"Look out about these days (1900) for carriages and traveling saloons on country-roads — sans horses, sans steam, sans any visible motive power, moving with greater speed and safety than at present. Carriages will be moved by a strange and beautiful and simple admixture of aqueous and atmospheric gases — so easily condensed, so simply ignited, and so imparted by a machine somewhat resembling our engines, as to be entirely concealed and manageable between the forward wheels. These vehicles will prevent many embarrassments now experienced by persons living in thinly populated territories. The first requisite for these land-locomotives will be good roads, upon which, with your engine, without your horses, you may travel with great rapidity. . . . I find only one thing necessary to have aerial navigation, viz.: The application of this superior motive power, which is even now in process of discovery and elimination. . . . This power will come. It will not only move the locomotive on the rail, and the carriage on the country road, but aerial cars also, which will move through the sky from country to country; and their beautiful influence will produce a universal brotherhood of acquaintance." Passage quoted from "The Penetration" by A. J. Davis, published in Boston in 1856, in "The Story of Prophecy," by Henry James Forman.

GREENFIELD VILLAGE—An impressive upturn in tourist activity was registered last summer at Henry Ford's historic Greenfield Village, Dearborn, Mich., where the motor car manufacturer has assembled much of American historical interest. August, 1936, attendance of 114,346 topped all previous monthly records. Labor Day, Sept. 7, was the largest single day in the history of the village with 14,113 visitors. Up to Sept. 8 last 391,241 persons from every state in the union and numerous foreign countries had been guests of the village.

MORE TRUCKS—More commercial vehicles will be sold in 1937 than in 1936 in the opinion of W. E. Holler, vice-president and general sales manager of the Chevrolet Motor Co. Business, industry and agriculture alike will contribute to this increase, believes Mr. Holler, for all three are in better shape than they were a year ago. Chevrolet has projected 225,000 units as its truck sales goal for the year, a figure 20,000 higher than the 1936 total.

CARS TELEVISED—An experimental television program was staged during the London automobile show when a parade of 20 cars was driven past the television camera while an announcer described them.

Two More Packards

120 DeLuxe Has 3 Body Types; Station Wagon Added

Two additional new cars are now being announced by the Packard Motor Car Co. One is the Packard One Twenty DeLuxe with three different body types, five passenger touring sedan, five passenger club sedan and five passenger touring coupe. The other is the Packard Six station wagon.

The DeLuxe cars have the regular One Twenty chassis with its 120-in. wheelbase and 120 hp. engine. Finish of both the exteriors and interiors largely follows the same material and method used with the larger and more costly Super Eight Packards. The radiator is equipped with Super Eight type chromium plated and thermostatically operated shutters. A chromium plated wire spoke steering wheel and chromium plated steering column is used. Upholstery and trim is of the Super Eight type and a deeply upholstered center arm rest is provided for the rear seat.

The station wagon, which is a new type of car for Packard, has paneled sides with highly polished natural wood finish. There are four doors and a seating capacity of eight. The two rear seats are readily removable when the car is to be used for hauling baggage, giving ample space which can be expanded to take several additional pieces of luggage by lowering the end gate at the rear.



FRANK H. PRESCOTT, now general manager of the Delco Products Division of General Motors Corp. at Dayton, O., has been elected a vice-president of Electro-Motive Corp. by the board of directors and has been appointed general manager of Electro-Motive Corp., effective Nov. 1, when he will relinquish his duties with Delco.

WILLIAM C. ENRIGHT has been appointed technical representative in the Detroit office of the Western Felt Works, Stephenson Bldg. He will cooperate with the engineering and purchasing departments of his firm's customers. Mr. Enright has been closely engaged in the automotive industry for a number of years as a mechanical and laboratory technician.

C. C. NETHERCUTT, manager of car sales for the Studebaker Export Corp., has resigned after 27 years with the Studebakers in South Bend. His service began in 1909 as a clerk in the horse-drawn vehicle division and since 1920 has been with the export division.

FRANK SCHUBERT, who for the past three years has been assistant to the president of the Bearings Co., has become associated with the management of the

Houde Engineering Corp., a division of Houdaille-Hershey, of Buffalo, N. Y.

GEORGE H. BUCHER has been elected executive vice-president of the Westinghouse Electric and Mfg. Co. by the board of directors. Mr. Bucher has been with the company since 1909.

J. A. TUMBLER, president of J. A. Tumbler Laboratories, Baltimore, sailed on the Ile de France, Oct. 10, to complete arrangements for the establishment of a factory in England from which the company's European business will be handled.

STANWOOD W. SPARROW has been named research engineer of the Studebaker Corp., succeeding W. S. James who recently became chief engineer. Mr. Sparrow has been a member of the Studebaker engineering staff for several years and was formerly with the U. S. Bureau of Standards.

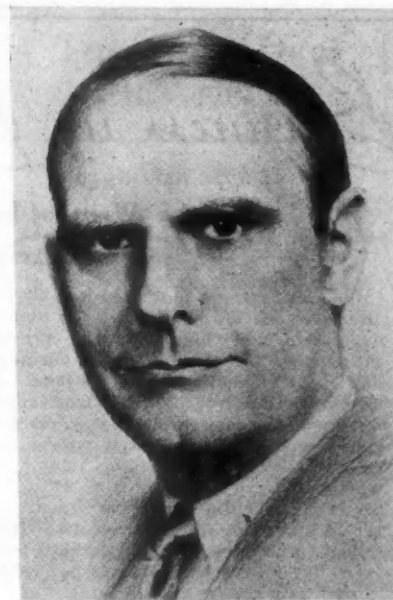
S. F. D. MEFFLEY, vice-president of the Recording and Statistical Corp., New York, in charge of the Chicago office, has joined the staff of the National Automobile Dealers Association to serve in an advisory sales capacity.

General Motors to Hold Show at Waldorf-Astoria

The General Motors show for 1937, occupying the entire third floor of the Waldorf-Astoria, will open Nov. 11, and will be open to the public daily through Nov. 18, it was announced by J. W. Dineen, director of the sales section of General Motors.

Hours of the show will be from 10 a. m. until midnight. A decorative motif of two shades of mauve and white with chrome trimming will be used in the grand ballroom of the Waldorf, which will house the central display of the General Motors show.

Carl Hoff and his widely known radio



W. L. Batt
President of SKF Industries, Inc., Philadelphia, will act as toastmaster at the annual SAE dinner in New York Nov. 12.

and dance orchestra will be featured in afternoon and evening concerts daily throughout the period of the show.

Forty-two 1937 models of Chevrolet, Pontiac, Oldsmobile, Buick, LaSalle and Cadillac will be exhibited in the General Motors show. Frigidaire will occupy a prominent section in the exhibit. Progress in the development of automotive products will be shown in the display of the General Motors Research Laboratories.

Dodge Labor Grievances Settled

Controversy Over Rehiring Former Workers Ended by Works Council Representing Both Sides

An agreement to adjust grievances in connection with seniority regulations affecting several hundred workers of the Dodge plant of Chrysler Corp. was reached on Friday last week, ending several weeks of negotiations in which representatives of the United Automobile Workers Union and the Committee for Industrial Organization figured prominently.

Controversy arose over the rehiring of Dodge workers for new model production, complaints being made by the workers that seniority rules were ignored. The UAW also claimed discrimination against three men who had been discharged for alleged union activities. Mass meetings were conducted by union leaders almost nightly during the negotiations and seven of the departmental units of the local had already taken strike votes with only 11 votes cast against using the strike weapon if necessary. Four other units

were preparing to vote when settlement was reached.

The management admitted that in the rush to start new model production, seniority rules had not been strictly observed, explaining also that it was necessary to find entirely new jobs for several hundred men who had performed work on previous models that would not be required on the new cars. The company agreed to find work for the three men discharged and to return others, who had been laid off, within 10 days and in accordance with seniority regulations.

Settlement was reached in the Works Council, consisting of 52 representatives of the employees and 52 men representing management. Richard Frankenstein, chief organizer for the UAW, happens also to be one of the 52 representatives of employees, having been a Dodge worker before taking the full time position with the union.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

General business continued its upward trend last week and recorded the fourth successive new high for the current movement. The weekly index of business activity compiled by the "Journal of Commerce" passed the 100 mark last week and exceeded the 1930 level. Wholesalers have received heavy orders for holiday merchandise and the volume of wholesale buying ranged from 18 to 25 per cent above that in the corresponding period last year. Retail trade also continued to improve, and gains above last year's level were from 9 to 22 per cent.

Carloadings Higher

Railway freight loadings during the week ended Oct. 10 amounted to 820,195 cars, which marks an increase of 1069 cars above those during the preceding week, a gain of 86,041 cars above those a year ago, and a rise of 183,196 cars above those two years ago.

Food Costs Firm

According to the Bureau of Labor Statistics, retail food costs from Aug. 18 to Sept. 15 increased 0.4 per cent. Of the 84 items in the index, 61 rose, 21 declined, and two remained unchanged. The current level is 84.3 per cent of the 1923-25 average.

Power Holds Steady

Production of electricity by the electric light and power industry in the

United States during the week ended Oct. 10 was at about the same level as in the preceding week and was 16.1 per cent above that in the corresponding period last year.

Big Construction Gains

Construction contracts awarded in 37 eastern states during September, according to the F. W. Dodge Corp., amounted to \$234,270,250, as compared with \$275,281,400 for the preceding month and \$167,376,200 a year ago. Residential construction alone amounted to \$80,669,800, as compared with only \$41,810,800 a year ago. During the first nine months of this year residential construction was 73 per cent above that in the corresponding period last year.

Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended Oct. 17 stood at 83.8, the same as the week before, as against 84.0 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Oct. 14 showed no changes in holdings of discounted bills, bills bought in the open market, and government securities. Money in circulation increased \$11,000,000, and the monetary gold stock rose \$32,000,000.

in production costs, overhead and administrative expense and will result in greater efficiency of operation.

It is intended that the present competitive lines of outboard motors, Elton-Evinrude and Johnson, will be continued on a strictly competitive and independent basis not only as to the sales and distribution, but also in design, development, construction, and operating policies. Engineering, design, sales, advertising, are to be carried on separately. Distributorships and dealerships in each line will not be merged; instead, the two competitive sales organizations will be retained and given full scope for development.

NEMA Establishes Welding Development Headquarters

Realizing the need for cooperative development of the industrial applications of the electric welding process, the electric welding section of the National Electrical Manufacturers Association has established development headquarters in the Frick Building, Pittsburgh, Pa. The welding section has initiated a program in which especial attention will be given to application engineering, including the preparation of reliable information on cost savings through the use of electric welding, the preparation of material for the use of and cooperation with construction engineers, designers and architects, and the direct promotion of electric welding by missionary work on important new or undeveloped applications.

Chrysler Preview for Detroit

The people of Detroit were given an opportunity to see the new 1937 Chryslers and Plymouths in advance of the public announcement. The complete line was on display at the Chrysler factory showroom on East Jefferson Avenue Oct. 17 and 18, and the 1937 Royal at factory branches and dealers' showrooms.

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

The effect of wind resistance on the progress of a road vehicle has not been sufficiently considered. As speed increases this factor becomes of greater importance. The high winds which prevailed over much of the Paris-Marseilles course gave the contestants a chance to see the difference between a favoring and an adverse wind, as was the case also at Providence, R. I., last month. On the first and second days the wind was high, but the third heat was run in a calm, and much faster time was made. It would have been impossible for the vehicles that competed there to have reached a speed of 26 m.p.h. facing a strong gale.

—From *The Horseless Age*, Oct., 1896.

Japanese Quotas Set

Ford May Build Up to 12,360,
GM 9470 Per Year

Under the provisions of the Automobile Industry Law the Japanese Ministry of Commerce and Industry, following the issuance of manufacturing licenses to two American and two domestic makers, has now fixed the production quotas of the foreign companies. Under the decision, the number of motorcars to be manufactured by the Nippon Ford Co., Ltd., Tsurumi, near Yokohama, is limited to 12,360 units per annum, while General Motors (Japan) Ltd., Osaka, is allowed to turn out 9470 units or less a year.

The Ministry's decision is based on the average number of automobiles turned out by the respective companies for the three years prior to Aug. 9 of last year, when the outline of the Automobile Industry Law was announced.

Automobile registrations in Japan have been increasing in recent years at the rate of 10,000 a year and totaled some 135,000 units in October last year, according to the latest available figures. The local demand is estimated at 30,-

000 cars per year, of which some 20,000 cars are of the standard passenger type.

Nissan Jidosha and Toyoda, the leading Japanese manufacturers, intend to produce about 6000 cars a year. Taking the above figures into account, it is difficult to understand how they will be able to sell that many, unless they export part to Manchukuo or encroach upon the volume of the foreign makers, who with their combined average output of 21,830 units have in the past satisfied the entire local demand.

Outboard Makers Merge; Lines Remain Competitive

Special stockholders' meetings, convened in Milwaukee and Waukegan, voted to consolidate the Johnson Motor Co. and Outboard Motors Corp. to form a new company to be known as Outboard, Marine & Manufacturing Co. The board of directors of each company held a meeting Aug. 28 and agreed, subject to the approval of the stockholders, on the consolidation. Directors of both companies express their belief that the consolidation will make possible worthwhile savings

Hudsons Set Records

With Terraplanes, Make New Marks at Bonneville

Forty official stock car records for endurance and sustained speed over long distances have just been broken on the Bonneville Salt Flats, Utah, under supervision of the Contest Board of the American Automobile Association, by the new 1937 model Hudson and Terraplane cars, according to an announcement by W. R. Tracy, vice-president in charge of sales of the Hudson Motor Car Company.

The records include the unlimited class closed car record for 24 hr., which was captured by Hudson, and the unlimited closed car record for 1000 mi., which was broken first by a Terraplane Brougham at an average speed of 86.54 m.p.h., and then smashed by a 1937 Hudson at 88.99 m.p.h. The 24-hr. record of 87.67 m.p.h., captured by the Hudson, betters one set in 1934 at a speed of 84.43 m.p.h. The car covered 2104.22 mi. in the full-day period.

In addition to the 24-hr. mark, every time and distance record for closed cars, regardless of size or price, was broken by the Hudson from 500 to 2000 mi. and from 6 hr. to 24 hr. This includes nine official unlimited closed car records recognized by the Contest Board of the American Automobile Association. Besides the unlimited records, Hudson smashed 23 Class C closed stock car records. This class includes all cars with piston displacements up to 305 cu. in., which takes in practically every American stock car regardless of price or size. These records were for 10 to 2000 mi., and from 1 hr. to 24 hr.

Besides the 1000-mi. unlimited record, the new Terraplane broke seven Class C marks. No attention was given to the short sprint records, but only to the long distance marks, which were run with the idea of emphasizing the stamina and reliability of the cars, rather than stressing speed primarily.

These records are awaiting official promulgation by headquarters of the AAA Contest Board in Washington.

Tire Production 25.6% Higher Than Year Ago

Shipments of pneumatic casings during the month of August are estimated at 4,976,383 units, a decrease of 13.4 per cent under July but five per cent above shipments made in August, 1935, according to statistics released by the Rubber Manufacturers Association, Inc. This organization estimates production of pneumatic casings for August at 5,014,415 casings, a decrease of 8.2 per cent under July but 25.6 per cent above August, 1935.

Pneumatic casings in the hands of manufacturers, Aug. 31, 1936, are estimated at 7,793,438 units, an increase of less than one per cent over the stocks on hand July 31, and less than one per

cent below stocks on hand Aug. 31, 1935.

Consumption of crude rubber by manufacturers in the United States for the month of September is estimated to be 46,330 long tons, which compares with 46,657 long tons for August. September consumption shows a decrease of less than one per cent under August but 24.9 per cent above September a year ago, according to statistics released by the Rubber Manufacturers Association today. Consumption for September, 1935, was 37,086 (revised) long tons.

This organization reports imports of crude rubber for September to be 48,386 long tons, an increase of 13.7 per cent over August figure of 42,563 long tons, and 40 per cent over the 34,569 long tons imported in September, 1935.

Total domestic stocks of crude rubber on hand Sept. 30 are estimated at 228,477 long tons, which compares with Aug. 31 stocks of 229,056 long tons and 331,121 (revised) long tons on hand Sept. 30, 1935.

Crude rubber afloat to U. S. ports as of Sept. 30 is estimated to be 62,240 long tons as compared with 63,597 long tons afloat on Aug. 31 and 43,413 long tons afloat on Sept. 30 a year ago.

September reclaimed rubber consumption is estimated at 11,170 long tons, production 12,959 long tons, stocks on hand Sept. 30, 24,950 long tons.

Cooperative Truck Service To Carry Mail in Mexico

Freight, mail and express truck service with 90 vehicles is soon to be established on a regular schedule basis over the international highway between Mexico City and Nuevo Laredo, on the American border, by the Union Nacional de Transportes, a cooperative society, which has obtained a concession from the ministry of communications and public works.

This service is a part of President Lazaro Cardenas' program to encourage regular transportation facilities on the highway. Service will be conducted on the divisional system: Mexico City - Jacala, Jacala - Limon, Limon - Montemorelos and Montemorelos - Nuevo Laredo. The schedule calls for running time of 29 hrs. 30 min., between terminals, a distance of 762 mi. The present time is 32 hours. The society estimates that it will save the government some 4000 pesos (about \$1,120) a year in moving mail.

Big Gain in Automotive Lineage in Newspapers

September automotive lineage in newspapers, compiled from Media Records measurements in 52 cities and reported by *Editor & Publisher*, rose from 2,909,990 in 1935 to 4,256,877 last month, a gain of 46.3 per cent. This figure was, however, slightly below that of August, 1936, when lineage measured 4,908,037.

The Once Over

By H. I. PHILLIPS

Vegetables and Motors

AN auto magnate says the farm and the factory are becoming more and more inseparable. He predicts that the farmer may soon find the industrialist his biggest customer.

* * *

Vegetables are already being used to make automobile parts, he says, and he emphasizes the fact that from the soy bean he has made enamel, windshield moldings, horn buttons and gear-shift lever balls.

* * *

Industry is being put on a vegetable diet.

* * *

Look at your instrument board, and what do you see? A speedometer, a clock, an oil gadget and various other gadgets. But who knows but what they may be really glorified tomatoes?

* * *

THE vanity case in the deluxe sedan may be a quart of string beans developed to their highest form, the ash tray may be a cucumber that has achieved its ultimate goal, and when you use the speaking tube to address the chauffeur you may really be shouting through a hubbard squash.

* * *

Your radiator ornament may be nothing more than an eggplant that has made good in the city.

* * *

The rain may be wiped from your windshield by a potato, and for all you know in these scientific days, when you glance into the mirror to see if a motorcycle cop is coming you may be looking for trouble in what was once a turnip.

* * *

YOUR brakes may have formerly come under the head of fresh country vegetables, a tiller of the soil may have helped produce your shock absorbers, and your automobile horn may represent a plate of green peas gone highbrow.

* * *

It is possible that your electric cigarette lighter was on a bunch of asparagus tips and that when you yank out the choke you are merely calling on the spinach kingdom for assistance.

* * *

All of which will come as news to most drivers. Up to this time they had thought the only vegetable product in the old bus was the back-seat driver.

—From the Oct. 20 daily "column" by H. I. Phillips, reprinted by special arrangement with the copyright owners, Associated Newspapers, Inc., New York.

Truckers Discuss Problems

Annual Meeting of ATA in Chicago Hears Recommendations as to Rates; Rogers Re-elected President

By George Applegren

With an attendance of more than 2000 truckers, representing all branches of the industry and coming from every state in the Union, the third annual convention of the American Trucking Associations was held in Chicago Oct. 19-21.

Chief discussion in the open meetings centered around reviewal of the trucking industry under the seven months' experience since the Interstate Commerce Commission assumed jurisdiction, reports of the national officers, expressions from shippers as to their views of the industry, and opinions of truckers as given by competitors.

The convention was given over largely to group meetings, with representatives of the several branches of the industry discussing in their own conferences problems pertinent to their particular fields.

Chief among the recommendations from the group conferences came from the meeting of furniture haulers, where two rate schedules have caused considerable confusion in the past. Several states are operating on a weight rate in intrastate movements, which is the basis on which practically all freight is moved. In interstate movement, however, furniture is carried on a cubical contents basis. The group unanimously adopted a resolution urging the Interstate Commerce Commission to issue an early ruling converting the interstate movement to the hundred-weight basis.

All of the groups adopted resolutions opposing the move of Class 1 railroads for store-door pick-up and delivery service, charging that in the majority of cases the allowances made by the roads to operators are barely compensatory.

The Association adopted a resolution opposing the Social Security Act, terming it an unjust levy on employers, tending to retard employment and increase cost of operations unnecessarily.

Speaking at the opening session, Commissioner William E. Lee made emphatic denial that the Interstate Commerce Commission had employed "G-men" to spy on the trucking industry. He said it was not the commission's intent to assume the roll of a "back seat driver," but rather to be helpful and to assist the industry to raise itself to a profitable plane. He said that the commission intends, as soon as it can do so, to "crack down" heavily on chiselers and those who employ rebates and other unfair practices.

Speaking for truckers' competitors, John R. Turney, former chief of the traffic division of the office of the Federal Coordinator of Transportation, declared that the trucking industry could serve itself "well by not falling

into the pits of despair which have so engulfed the railroad rate structure." He urged the trucking industry to set up its own rates as based on costs of doing business plus a fair profit.

Speaking for shippers, L. E. Muntwyler, traffic manager of Montgomery Ward & Co., and chairman of the traffic section of the National Retail Dry Goods Association, said that shippers of freight by motor truck desired the trucking industry and those handling freight to earn a profit on the operations. "Unless you do earn a profit," said Mr. Muntwyler, "the kind of service you render will fall to such a low level that shippers will be forced, in defense against your own practices, to turn their tonnage over to your competitors."

Ted V. Rodgers, of Scranton, Pa., was re-elected president of the ATA to serve his fourth year in office.

Other officers elected were: Chester G. Moore, Chicago, secretary; Louis A. Raulerson, Jacksonville, Fla., treasurer; H. D. Norton, Charlotte, N. C., first vice-president; Griswold B. Holman, Jersey City, N. J., second vice-president; Clinton S. Reynolds, Seattle, Wash., third vice-president; and Fisher G. Dorsey, Houston, Tex., fourth vice-president.

Walsh-Healey Enforcement Strict

Exemption from Hour-Wage Provisions Refused on Continuous Process Work

The wage and hour provisions of the Walsh-Healey government contracts are to be rigidly enforced. This fact is made clear by a recommendation of the Public Contracts Board of the Department of Labor in its first finding, approved by Charles O. Gregory, acting Secretary of Labor. The board declined to recommend an exemption from the 40-hr. week and 8-hr. day provisions which had been requested by the Cotton Textile Institute. The Institute

wanted an exemption from the requirement of a minimum overtime rate of pay of time and one-half in connection with labor engaged on a continuous chemical process where the goods would be jeopardized by interruption. Inasmuch as no exemption will be allowed with regard to continuous process industries it is evident that it will be denied other industries with less reason for seeking exemption.

The Public Contracts Board and the Department of Labor itself have indicated their belief that payment of an overtime rate is mandatory. This view is not shared by some legal students.

The board has announced an amendment to its regulations covering records of employment to be kept by contractors engaged on Government work. It is required that contractors shall keep records giving the name, address, sex and occupation of each employee covered by contract stipulations, together with the dates of birth of employees under the age of 21, and the following:

Wage and hour records for such employee including the rate of wages and the amount paid each pay period, the hours worked each day and each week, and the period during which each such employee was engaged on a Government contract with the number of such contract. Compliance with this subsection (c) shall be deemed complete if wage and hour records for all em-



The Soviet motor industry has added motorcycles to its products. Wives of workmen who made the machines in the Izhevsk plant recently tried 15 out on a run of 1041 mi. to Moscow. All finished the trip without a breakdown, it is said.

ployees in the plant are maintained during the period between the award of any contract and the date of delivery of the materials, supplies, articles or equipment: provided, that where no separate records for employees engaged on Government contracts are maintained, it shall be presumed until affirmative proof is presented to the contrary that all employees in the plant, from the date of award of any such contract until the date of delivery of the materials, supplies, articles or equipment, were engaged on such Government contract.

The records, which shall be available for the inspection and transcription of authorized representatives of the Secretary of Labor, are to be kept on file for at least one year after the termination of the contract.

Dealers Get Sample Cars

(Continued from page 529)

totaled 277,000 units, of which 225,000 were passenger cars and 52,000 trucks. As it looks now, October will have difficulty in reaching the 185,000 unit volume of October last year. Because of the earlier automobile show a year ago, the new car program was farther advanced. More new lines were on the market, including Ford which came out on the 15th and contributed largely to the month's sales figure. This year Ford was one of the last to get under way on 1937 production. New cars began rolling off the assembly line at the Rouge plant early this week, but production is still on a small scale and has not been started at assembly branches, some of which, however, are due to start next week. Oldsmobile, the last of the General Motors' divisions to swing into line, began assembly operations Oct. 20. Because of the late start by these important producers, October production will fall considerably short of the 280,316 units turned out last year and will probably do well to hit 235,000 units.

Sales of General Motors cars and trucks to dealers in the overseas markets during September totaled 23,712 units, representing an increase of 3.5 per cent over the volume in September of last year, and a decrease of 5.0 per cent under the volume in August of this year. In the first nine months of 1936, sales totaled 247,639 units. This total represented the largest volume for the corresponding period of any year in the history of General Motors overseas operations, and was 14.6 per cent over the volume of 216,062 in the first nine months of 1935. These figures include the products of the corporation's American, Canadian, English and German factories sold outside of the United States and Canada.

Studebaker sales for 1936 to date are 68 per cent ahead of the corresponding period last year, according to an announcement by Paul G. Hoffman, president of the corporation. Sales during

the first 10 days of October totaled 3961, compared to 513 last year. This brings the total sales from Jan. 1 to 67,260 compared to 40,080 in the same period last year.

Austin Invades U. S.

(Continued from page 529)

drive prove acceptable to American customers?

These are some of the questions asked Sir Herbert Austin, Great Britain's volume producer, by AUTOMOTIVE INDUSTRIES over the transatlantic telephone Thursday.

There is an excellent market in this country for his car, said Sir Herbert. The price of the cars will be approximately the same as in England, that is, from about \$500 to \$700. This, together with the fact that nothing similar is being built here, should assure a market of about 5000 cars during the coming year, said the manufacturer of England's most famous "baby" car.

Austins exported to the U. S. will be equipped with left-hand steering. It is expected that the two-passenger sport model, with a special, stepped-up engine, will prove to be the most popular type.

The factory itself will maintain no sales organization in the U. S., said Sir Herbert, but will sell cars to a few authorized distributors, each having exclusive rights to a part of the country. The Southern Automobile Distributors of Atlanta, Ga., an organization headed by R. S. Evans, president of the American Bantam Car Co., Butler, Pa., has been given a franchise for the southeastern states, and has already shipped sample cars to Jacksonville, Fla., and Butler, Pa. Distributors will be announced soon for other territories, according to the manufacturer.

Retail sales of the Austin in the New York region are being handled by Thos. L. Hibbard Associates, 21 East Fifty-Seventh Street. Mr. Hibbard, head of this firm, is also a vice-president of the American Bantam Car Co. Retail prices in New York are as follows: 2-pass. roadster, \$495; 4-pass. touring car, \$565; 2-door, 4-pass. sedan, \$595; 2-door, 4-pass. sedan with sliding roof, \$640; 2-pass. sport model, with special engine, \$745.

NADA Executive Committee Plans Group Cooperation

The executive committee of the NADA held its regular meeting at the Hotel Statler, Detroit, Oct. 15-16. A tentative program of cooperation with State and local association groups and operating the budget was formally approved. Under this flexible program, the national, State and local activities will be coordinated wherever possible in order that the trade may present a united front and cooperate with other component parts of the industry along constructive lines.

Senator Couzens Dies

Early Partner of Ford Left Industry for Politics

Death came to Senator James Couzens on Thursday, Oct. 22. The 64-year old millionaire ex-manufacturer and ardent New Dealer failed to rally following an operation at Harper Hospital, Detroit.

Couzens, a native Canadian, had a colorful career in business and in politics. He was traffic manager for a retail coal dealer in Detroit when Henry Ford entered the automobile scene. Seeking to organize his own company, Ford was able to raise only \$28,000 of the needed \$100,000. Couzens became interested and subscribed for 25 shares, or \$2,500 worth, when the Ford Motor Co. was incorporated in June, 1903, assigning one of them to a sister.

Leaving his desk at the coal yard, Jim Couzens took over the routing of buying and selling and of financing for the new Ford Motor Co. Teamed with him in engineering and production was C. Harold Wills, later to build the Wills Ste. Clair automobile at Marysville, Mich. Ford, Couzens and Wills formed a trio that went far.

Although he severed active connection with Ford in 1916, Couzens remained a director until 1919, when Ford bought out all other stockholders. A 1900 per cent stock dividend in 1908 had increased Couzens original 24 shares to 2180. For these he received \$29,308,857—said to be the top price paid by Ford to any stockholder. In addition, it is estimated that in the 16 years from 1903 to 1919 Couzens took out fully \$5,000,000 in dividends.

His departure from the Ford Motor Co. released Couzens for a civic career which he long had visualized. He became mayor of Detroit, in 1922 went to the U. S. Senate for a short term and was reelected in 1924 and 1930.

In the Senate he developed rapidly into a liberal. In this year's primary campaign, which resulted in his retirement, Couzens refused to take the stump. He contented himself with an indorsement of Roosevelt and the observation that it was more important for the President to be reelected than for himself to return to the senate. His opponent assailed the New Deal, and won.

A noted philanthropist, his chief gift was \$10,000,000 to found the Children's Fund of Michigan. He stipulated that the entire sum, with its income, was to be spent in 25 years.

1937 Plymouth Prices

	Six	1937	1936	Change
Bus Sedan (2 door)....	550	545	+5	
Bus Sedan (4 door)....	595	590	+5	
Bus Coupe	510	510	...	
De Luxe Six				
Sedan (2 door).....	640	625	+15	
Sedan (4 door).....	670	660	+10	
Tour. Sedan (2 door)...	650	645	+5	
Tour. Sedan (4 door)...	680	680	...	
Coupe with rumble seat	625	620	+5	
Coupe	575	580	-5	

Automotive Metal Markets

Much of Steel Mills' Unused Capacity Believed Obsolete, but Margin Still Well Above Present Demand

By William Crawford Hirsch

Motor car manufacturers and parts makers are releasing specifications to steel mills in conformity with their own production schedules for November, in so far as these have assumed definite shape. The only exception are cold-rolled sheets. Many mills have allocated virtually all of their November output of cold-rolled sheets and, so as to be certain of deliveries when the material is needed, a good deal of December business has been placed by automotive consumers and more is expected to come out before the end of October.

Hot-rolled annealed sheets, in which there has been a price advance, and strip steel are under no such pressure. Nor do buyers experience any difficulty in obtaining satisfactory deliveries in soft steel and alloy bars. Bolt and nut requisitions are on the uptrend, following a rather dull spell.

A slight drop in this week's rate of ingot output, approximately 2 per cent, revived discussion in the steel market as to how much of the idle capacity, reported by the American Iron & Steel Institute at 25.8 per cent this week, would be available for immediate use. In some quarters it is contended that usable capacity, not now in operation, is less than one-half what one would glean from the Institute's figures. These are based on a rating of close to 70,000,000 tons a year potential output, made at the close of last year. Meanwhile a good deal of the equipment undoubtedly has come to be obsolete or would at least require extensive reconditioning that would take considerable time. On the other hand, some of the steel producers have enhanced their operative capacity by installations and repairs. Certain it is that primary steel-making capacity is such as to afford a comfortable margin between what is supported by current and maximum demand.

Pig Iron—Automotive foundries appear to be fairly well covered for the current quarter, and blast furnace sales agencies do not look for really spirited contracting for the first quarter of the new year to get under way before the middle of November. Prices are unchanged, with predictions of an advance in 1936 prices unabated.

Aluminum—Steady all around. Both primary and secondary metal prices are unchanged.

Copper—According to a prominent brass company executive, automotive takings of copper and its alloys in 1936 will exceed 200,000,000 lb. The copper market's statistical position, together with price rises in foreign markets, again brings into the foreground the possibility of an early advance to the 10-cent price level. So far, however, nothing resembling a protective buying movement here has come to notice, the price for electrolytic copper continuing at 9 3/4 cents, delivered Connecticut.

Tin—At the beginning of the week's trading on the London Metal Exchange, rumors that the International Tin Committee, meeting at The Hague this week would come to an agreement with Siam regarding production restrictions, sent prices higher. Later

cables put a damper on these prospects, saying that Bangkok would have to be consulted and would have the last word. Here the price for spot Straits tin was 45 cents at the week's opening, denoting a 1/2-cent advance.

Lead—Irregularly higher and active.

Zinc—Quiet and unchanged.



A booklet to assist the users of aluminum in solving their finishing problems has been prepared by the Aluminum Co. of America, Pittsburgh.*

Bulletin 536 just issued by Young Radiator Co., Racine, Wis., describes their radiators for cooling gasoline or Diesel engines in trucks, coaches, tractors and other equipment.*

Brown Instrument Co., Phila., recently published a catalog on their air operated controllers for the control of temperature, pressure, flow and liquid level.*

A 16-page booklet brought out by the

Carbondale Machine Corp., Harrison, N. J., explains the absorption method of refrigerating and gives detailed information on the Carbondale units.*

Two new data books, No. 782 for multiple groove drives and No. 783 for fractional horsepower single groove drives, have been announced by the Rockwood Mfg. Co., Indianapolis, Ind.*

The Synthane Corp., Oaks, Pa., has announced a six-page general folder on the grades, physical, chemical, mechanical and electrical properties, shapes, characteristics and standards of quality of Synthane laminated bakelite tubing.*

Floor trucks for factory, warehouse and industrial uses are pictured in folder No. 225 recently brought out by the Lewis-Shepard Co., Watertown, Mass.*

Two new catalogs, filled with practical chain information, including specifications, full size illustrations of many patterns and other useful facts, have been published by the American Chain Co., Inc., Bridgeport, Conn.*

A manual, giving in detail methods for the application of sodium cyanide solutions in the preparation of metal surfaces, has been announced by the R and H Chemicals Dept., E. I. duPont de Nemours and Co., Wilmington, Del.*

The Ditzler Color Co., Detroit, has published an informative booklet which deals with the finishing and refinishing of automotive equipment. It will be furnished free to manufacturers and repaint men.

Information on featherweight (Dow-metal) flasks, aluminum flasks, steel plate, pouring jackets, flexible aluminum pouring jackets and flexible cast iron pouring jackets is contained in booklet No. 551, which has just been published by the American Foundry Equipment Co., Mishawaka, Ind.*

The 16-page booklet, designated as Bulletin No. 1104, which has been prepared by the Carbondale Machine Corp., Harrison, N. J., explains the absorption method of refrigerating and gives information on the Carbondale units.*

*Available through AUTOMOTIVE INDUSTRIES

Calendar of Coming Events

SHOWS

9th International Automobile Salon, Milan, Italy	November
National Motor Truck Show (N. J. Motor Truck Assn.), Newark, N. J.,	Nov. 3-7
Canadian National Automobile Show, Toronto	Nov. 7-14
National Automobile Show, Grand Central Palace, New York	Nov. 11-18
Omaha Automobile Show	Nov. 11-15
Philadelphia Automobile Show	Nov. 12-19
Scottish Motor Show, Glasgow	Nov. 13-21
International Aviation Show, Paris, France	Nov. 13-29
Columbus Automobile Show	Nov. 14-20
Boston Automobile Show	Nov. 14-21
Buffalo Automobile Show	Nov. 14-21
Chicago Automobile Show	Nov. 14-21
Detroit Automobile Show	Nov. 14-21
New Haven Automobile Show	Nov. 14-21
Indianapolis Automobile Show	Nov. 14-21
San Francisco Automobile Show	Nov. 14-21
Washington, D. C., Automobile Show	Nov. 14-21
Cincinnati Automobile Show	Nov. 15-21
St. Louis Automobile Show	Nov. 15-22
Pittsburgh Automobile Show	Nov. 16-21
Brooklyn Automobile Show	Nov. 21-28
Cleveland Automobile Show	Nov. 21-28
Montreal Automobile Show	Nov. 21-28
Kansas City Automobile Show	Nov. 21-29
Milwaukee Automobile Show	Nov. 22-29
Portland Automobile Show	Nov. 22-29
Baltimore Automobile Show	Nov. 26-Dec. 5
28th Automobile Salon, Brussels, Belgium	Nov. 28-Dec. 9
Peoria Automobile Show	Nov. 30-Dec. 5
Natl. Exposition of Power & Mechanical Engineering, Biennial Meeting, New York City	Nov. 30-Dec. 5
First International Consumers Petroleum Exposition, Convention Hall, Detroit	Dec. 5-13
Automotive Service Industries Joint Show, Chicago	Dec. 9-13
National Motor Boat Show, New York, Jan. 8-16	
Illinois Automotive Ass'n, 4th Annual Show and Maintenance Exhibit, Navy Pier, Chicago	Apr. 24-28, 1937

CONVENTIONS AND MEETINGS

American Gas Association, Annual Meeting, Atlantic City	Oct. 26-31
American Foundrymen's Ass'n Conference on Foundry Practice, Univ. of Iowa, Iowa City, Ia.	Oct. 30-31
American Petroleum Institute, Annual Meeting, Chicago	Nov. 9-12
Society of Automotive Engineers Annual Dinner, New York	Nov. 12
American Association of Motor Vehicle Administrators, Annual Meeting, Hot Springs, Ark.	Nov. 12-14
International Day, National Automobile Show, New York	Nov. 16
National Foreign Trade Convention, Chicago	Nov. 18-20
16th Annual Meeting, Highway Research Board of the National Research Council, Washington, D. C.	Nov. 18-20
International Acetylene Assn., 37th Annual Convention, St. Louis,	Nov. 18-20
Natl. Industrial Traffic League, Annual Meeting, New York City	Nov. 19-20
Tin Can Tourists' Get-Together Meeting, Lake City, Fla.	Nov. 22-28
American Society of Mechanical Engineers, Annual Meeting, New York,	Nov. 30-Dec. 1
National Standard Parts Association, Annual Convention, Detroit	Dec. 7-8
Tin Can Tourists' Homecoming, Arcadia, Fla.	Dec. 28, 1936-Jan. 3, 1937
S.A.E. Annual Meeting, Detroit, Mich.,	Jan. 11-15, 1937
Tin Can Tourists' Winter Convention, Clearwater, Fla.	Jan. 29-Feb. 8, 1937
Tin Can Tourists' Winter Convention, Sarasota, Fla.	Feb. 8-14, 1937
International Association for Testing Materials, Second International Congress, London, England,	April 19-24, 1937
41st Annual Convention and Exposition of the American Foundrymen's Association, Milwaukee,	beginning May 2, 1937

The Horizons of Business

—By Joseph Stagg Lawrence

"We Did It"

IRONY with a gargoyle grimace looks upon the campaign and is deeply satisfied. One of the candidates preaches from the text, "Four Years Ago and Now." Four years ago the business man of the country wanted deflation halted. His party did it. Four years ago the business men were praying for a revival in the purchasing power of their customers, the industrial workers in the cities. The opposition counseled patience. His party responded with action and increased the purchasing power of these customers. The business man wanted rural buying power increased. His party did the trick. The business man sought a reduction in costs. His party cut interest, power, and transportation rates, all important elements in the cost of production. The business man begged for protection against crime "and we did it." This modest recital of accomplishment applies, of course, to the Democratic Party and is offered by its leader as adequate reason for his reelection.

A Mean Blow

The professional party workers of the opposition are greatly annoyed by this argument. It isn't a sportsmanlike argument. It violates the Queensbury rules of good, clean political fighting. It is hitting below the belt, cuffing in the clinches, rabbit punching back of the ears, insulting the paternity of the opponent and crossing rights after the bell, all in one. It is flagrant political larceny. Strip back the peculiarly contemporaneous embellishments of the argument and there stands forth the venerable campaign prop of the Republican Party—the full dinner pail. The credit for prosperity is a Republican war cry. It has rendered yeoman service for the grand old party in the past. In campaign after campaign Republican orators have been able to declare, with gifted rhetoric and vigorous gesture, that all the dividends of Mammon during the preceding four years had been declared by the Republican Party. Consider therefore the

anguish of these veteran workers as they see their cherished syllogism appropriated by an interloper. Understand therefore the wicked grin of Irony.

A Difficult Rebuttal

This is the toughest and most discouraging aspect of the campaign for the Republicans. They cannot and do not wish to dispute the fact of prosperity. The stock market, corporate earnings, carloadings, power consumption, steel operations, automobile output and farm income establish the fact. Had this Administration remained within the orthodox bounds of government power and exercised no more authority than other governments it might be a little easier to tag the fallacies of "we did it," a little easier to demonstrate the authentic causes. The difficulty is that the New Deal reached for extraordinary power to regulate economic process, so much so, that it repeatedly ran afoul of the Supreme Court. It went much further than any previous government in an attempt—a plausible attempt certainly in the eyes of the man on the street—to hasten artificially the course of recovery.

In fact so plausible is the claim of the New Deal to recovery that some of our ablest citizens accept the claim at its face value. Level headed Mr. Kennedy, the former chairman of the S.E.C., not only accepted the fact but became an enthusiastic evangelist to the extent of writing a book, syndicating the material in pro-administration newspapers and making speeches.

Choosing the Field of Battle

This is an issue that the Republicans, partly because they are Republicans, cannot effectively combat. It is not the issue which they wish to have discussed. They would like to make issues of the good faith of the candidates, regimentation, extravagance, taxation, inflation, violation of the constitution, affronts to the Supreme Court, spoilsmanship and the abuse of authority by

academic doctrinaires and bureaucratic shavetails. In this effort they are winning only partial success. Again and again the issue is brought back to prosperity. "We planned it that way and do not let anyone tell you any different."

Although Mr. Landon in at least one speech met this contention head on, it seems to us that Republican strategy fails to emphasize the weakness of the argument. Of course it is possible that the best minds in the Republican G.H.Q. are so tainted with the polemics of past campaigns that they inwardly concede the claim of the New Deal, to wit; it came in office at the trough of the depression; it initiated measures to bring prosperity around the corner; prosperity is here; therefore, the New Deal brought it.

Flaws in the Argument

There are vital flaws in the argument. The campaign has reached a stage so critical as to warrant an exposure of the prosperity fallacy even though it make some living Republicans uncomfortable.

1. It can be demonstrated quantitatively that the part played by the Government in the economic processes is not enough to control the cycle or even to affect it materially. The amount of work originated, income created, and business primed falls far short of the amount reasonably necessary to swing the cycle in any direction.

2. The evidence is overwhelming, incontrovertible and easily demonstrable that the depression, first, was universal, second, made its major turns down and up again at about the same time in all parts of the world. The upward turn in the greater part of the globe occurred during the summer of 1932. How could the NRA, the AAA, the repudiation of gold contracts and huge Government deficits in 1933, 1934, 1935 and 1936 cause an action in July, 1932?

3. While the rest of the world accompanied the rising slope of recovery after the summer of 1932, our country came to a dead stop and had a serious relapse in the spring of 1933. Barring the mushroom Johnson plus
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An Industry Comes of Age—First Aero

By R. DeWitt Miller

ATTENDED by more than five hundred delegates, the first National Aircraft Production Meeting, sponsored by the Society of Automotive Engineers, held sessions over a three-day period, October 15 to 17 inclusive, in the Ambassador Hotel at Los Angeles.

The meeting opened Thursday, October 15, with a welcoming ceremony and a technical session in the theater of the hotel. Ralph R. Teetor, president of the Society of Automotive Engineers, called the first session to order and introduced Leighton W. Rogers, president of the Aeronautical Chamber of Commerce of America, who welcomed the delegates on behalf of his organization.

Speaking in place of Alvin P. Adams, who was delayed in the east, Thomas Wolf of Western Air Lines spoke briefly on the significance and importance to transportation of this first annual gathering of the allied industries which go to make up the production of modern commercial and military airplanes.

The technical business of the convention got under way dramatically when Commander F. W. Pennoyer, U. S. Naval Aircraft station, San Diego, read a paper on the overhaul and maintenance of naval aircraft.

Discussion following Commander Pennoyer's talk brought out opinions that he had underestimated the problems with which he was confronted. Several trying experiences in maintaining planes on naval aircraft carriers were shot back from the floor.

"Maintenance Problems of Trans-Oceanic Flying Boats" was the title of a paper by C. H. Schildhauer, operations manager of Pan American Airways.

M. G. Beard, veteran test pilot of American Airlines, concluded the initial session with a discussion of modern

methods of lessening danger and increasing efficiency in test flying. His paper led to a lively technical discussion from the floor of recent experiments with new type smoke bombs for checking air-speed indicators.

The first evening session, held at 8 p.m., in the Indian room of the hotel, was presided over by C. E. Stryker, chief engineer, Curtis Wright Technical Institute.

R. A. Von Hake opened this session with a paper on "Tooling a Medium Sized Airplane Factory." Following a heated discussion of this talk, Bruce Burns, designing engineer, Northrop Corporation, read a paper on "Aircraft Spotwelding."

It was in the discussion of this paper that Leighton W. Rogers asked the classic question, "How long will it be before



Presenting the Wright Brothers' Medal Warner to Littlewood: "This medal is a lasting tribute to a couple of bicycle manufacturers whom their neighbors in Dayton, Ohio, thought were a little queer. (Right)

Edward P. Warner (left): "There is no room any longer for 'blacksmith's eye' in the aircraft industry."

Production Meeting

Leighton W. Rogers, president, Aeronautical Chamber of Commerce, reaches for the next paper at the Factory Equipment Session

John A. C. Warner, general manager, Ralph R. Teetor, president, and Mac Short, vice-president for aircraft engineering of the Society of Automotive Engineers, which sponsored the meeting, are reading one of the many congratulatory messages which attended its success. (Below)



spotwelding can safely be used on major members of airplane fuselages, and when that time comes, how long will it be before we can convince the Department of Commerce of that fact?"

To which Von Hake replied:

"Mr. Rogers, and gentlemen, I'm damned if I know."

At the morning session on Friday oils and vibration were discussed under the chairmanship of W. B. Goodman, field engineer, West Coast, Wright Aeronautical Corporation. The two papers in this field were "Selection of Oils for High Output Aircraft Engines," by A. L. Beall, research engineer, Wright Aeronautical Corporation, and "Aircraft Engine Installation Vibration Problems," by John Tyler, Lycoming Mfg. Co.

After the papers, Hamilton of Richfield Oil cited experiences to prove that theorizing on oils is useless, observation and experience being the only methods of arriving anywhere.

This in turn provoked E. P. Warner to ascend to the platform and uphold the theorists' point of view. He said:

"Animals learn by experience. Men learn in other ways. If trial and error

were the only way of solving mechanical problems, the industry we represent wouldn't exist. Theory and practice go hand in hand."

After the commotion had quieted down, J. Carlton Ward, Jr., assistant general manager, Pratt and Whitney

Aircraft Corporation, read his paper on "Radical Aircraft Engine Production."

The Friday afternoon session, presided over by L. H. Steward, featured two papers. Howard Houghton, chief draftsman, Douglas Aircraft Company, Inc., spoke on "X-Rays and Gamma Rays—Their Industrial Application." His lecture was elaborately illustrated by lantern slides.

"Large Scale Production Economics from Small Production Tools" was presented by George H. Prudden of Lockheed Aircraft Corporation. This was

Messrs. Houghton, Lynch, Moffat, Paine, Klein, Perrill and Dodds gather for a between-sessions discussion.



followed by floor discussion of drop hammer methods in fashioning small castings.

Presenting a rough draft of factory regulations, Richard C. Gazley, chief engineer, Manufacturing Inspection Service, Bureau of Air Commerce, talked on the subject "Factory Facilities and Federal Regulations."

Several of his points were called in issue by Leighton Rogers, who pointed out that "certain regulations such as those concerning the use of vises, are difficult to abide by in actual practice."

Retorted Edward P. Warner:

"When I was learning my trade I was instructed in the use of the 'blacksmith's eye,' which meant that you hammered away on a part, looking occasionally at the plans, laid a steel rule on the completed part, hoped it would be right, but put it on the shelf any-

way. Such methods, however, are somewhat out of place in the airplane industry."

This session was under the gavel of C. E. Stryker.

On Saturday morning the majority of the delegates went on an inspection tour of the world famous laboratories and shops at the California Institute of Technology at Pasadena.

Saturday afternoon a session under the leadership of Hall Hibbard, vice-president and chief engineer, Lockheed Aircraft Corporation, heard two papers; the first on "Design and Construction of Large Aircraft," by R. J. Minshall, John K. Ball, and F. P. Laudan, Boeing Airplane Co. The second was by A. E. Raymond, vice-president in charge of engineering, Douglas Aircraft Company, and was titled, "Designing to Please the Air Traveler."

rapid long distance transportation. Our industry was born at the beginning of the century; it had its growing pains, carefree childhood, and its adolescent pessimism. Now it has come of age."

This same thread was carried on by Edward P. Warner, when he presented the eighth annual Wright Brothers medal for the most outstanding paper in the field of aerodynamics or kindred subjects.

"This medal," Warner declared, "is a lasting tribute to a couple of bicycle manufacturers whom their neighbors in Dayton, Ohio, thought were a little queer."

William Littlewood, chief engineer of the American Airlines, was the recipient of the award. His prize-winning paper was entitled, "Operating Requirements of Transport Planes."

More than three hundred couples filled the Fiesta room for the celebration. Besides the representatives of all major airplane factories and commercial airlines, the banquet was attended by many scientists whose names are known by technicians in every field.

Featured speakers of the evening were three airline hostesses who spoke on interesting experiences in the line of their duty. T. W. A. was represented by Miss Ruth K. Rhodes, and United Air Lines by Miss Marceline Garvis, while Miss Ruth Spencer spoke for American Airlines.

Among those at the speakers' table were Leighton W. Rogers, president of the Aeronautical Chamber of Commerce of America, and John K. Northrop, president of the Northrop Corporation. The Society of Automotive Engineers was represented by three national officers, Ralph R. Teetor, president; Mac Short, vice-president; and John A. C. Warner, general manager.

Wright Medal Presented at Banquet

CONFETTI and streamers decorated the final session of the National Aircraft Production meeting which took the form of a banquet

and ball held in the Fiesta room of the Ambassador.

Beneath the gayety, there was a more significant note, a reminder of the tense technical meetings which had been held during the preceding three days. Through it all ran the spirit of a great industry suddenly realizing that it had come of age.

This note was first struck by Toastmaster William B. Stout, past president of the Society of Automotive Engineers, when he declared:

"It has been a long road from the days when the airplane was a sensational toy to the present time when it has become the greatest agency of



George H. Prudden, Lockheed, in a dramatic moment which occurred during his paper on "Large Scale Production Economies from Small Production Tools."

Technical Papers Cover Wide Range

Abstracts by P. M. Heldt

THREE groups of instruments are being used in making studies of resonant vibration in aircraft, viz., exciters, pick-ups and recorders, according to John M. Tyler of the Lycoming Division of Aviation Manufacturing Corp., who presented a problem on "Aircraft - Engine - Installation Vibration Problems" at the Los Angeles meeting.

Exciters are mechanisms used to produce artificial excitation. They can be mounted at various points on an engine to produce forces, couples, or torques, as desired. The most convenient type of exciter is one which can be

mounted on the propeller nut and operated at speeds varying from 500 to 5000 r.p.m. The Air Corps at Wright Field and Wright Aeronautical Corporation have been using exciters of this type for some time.

In making vibration studies of engines and propellers it is highly desirable to have an exciter which can be operated at up to 20,000 or 30,000 r.p.m. The most convenient set-up is an exciter of this sort with a Transitorq electric-motor drive. This is a constant-speed motor with an infinitely-variable transmission. A motor of this type is very stable with regard to speed

"Lighter Than Air"

AT the Friday afternoon session, George Prudden of Lockheed was illustrating an instance which happened some time ago, before handling of metal grain in drop hammer operation was fully understood. His company was called upon to make several aluminum toilet seats. "They were very unsatisfactory," said Mr. Prudden. The audience tittered. "Well, I wanted to use an illustration you were all familiar with," he retorted.

In commenting on Mr. Prudden's discussion of drop hammers and their mountings, T. A. Triplett remarked that when their first drop hammer was installed, it shook the plant so badly that the office force five hundred feet away could feel the jar. "We couldn't sleep a wink," he said. Then he went on to tell in detail about the installation of their

present hammer, enlarging greatly and seriously upon its mounting. He concluded by saying it couldn't be felt now a short distance away. "So everybody's asleep," commented chairman L. H. Steward.

A couple of good jokes were cracked by the welcoming committee; one concerned no less a person than Orville Wright. He had been studying the anatomy of birds in hope of discovering their secret of flight. A society invited him to present his findings at a banquet, and also invited some Frenchmen who had made a similar study. By the time the Frenchmen were through, it was time to go home. The chairman called on Wright, suggesting that he be brief. He was. "The only birds I ever saw that could fly couldn't talk," was all he said.

characteristics, which feature is extremely important in studying resonant vibrations, in which the power consumption of the exciter is extremely variable with speed. The propeller nut position for the excitation is very convenient, because from this point the effects of both dynamic and static unbalance in the crankshaft and propeller can be duplicated. The driving torque to the exciter is taken through a rubber hose coupling so that the installation will be free to vibrate. The high speed exciter must be driven through a step-up gear. In the high-speed exciter, the inner race of the ball bearing turns and the outer race is stationary. This construction appreciably reduces the peripheral speed of the balls. This high speed exciter was designed for continuous duty in fatigue testing. That accounts for its rugged construction.

An airplane vibration pick-up must be "flyable" because the last word in airplane testing must be obtained in the air. This means that the instrument must be remote recording. The instruments in use are made of a permanent magnet and a moving coil. A vibration pick-up of this type has been built by the Westinghouse Research Laboratories. It has been modified to lower its natural frequency for use in engine-installation work where measurements must be taken at speeds down to 1000 r.p.m. and lower. The

Navy has been sponsoring an instrument development program at the Massachusetts Institute of Technology recently in which a pick-up of similar design has been developed.

The output from these moving coil pick-ups is proportional to the relative velocity between the coil and the magnetic field. The pick-up is designed as a seismographic instrument with the magnet floating in space and the coil attached to the vibrating body. Thus the amplitude of the curve of the electrical potential at the terminals of the moving coil is proportional to the amplitude of vibration at a given frequency. However, as the frequency of the vibration changes, the output of the pick-up changes in direct proportion. Professor Draper at M.I.T. uses an integrator in conjunction with the pick-up to convert the velocity reading to displacement. However, most vibration studies are comparative, so it makes little difference whether the readings are in velocities or displacement. If the data must be converted into inches of displacement the readings must be divided by a calibration constant and in this operation the conversion from velocity can be made by dividing by frequency also.

There are two methods of taking records from these pick-ups. An oscillograph can be used to make photographic records or a harmonic analyzer can be used to obtain the readings

directly. The harmonic analyzer is an instrument which can be tuned to respond to any one frequency at a time. Thus it filters out all vibration frequencies except the one of interest at the time. Records are obtained by reading a meter and writing down the readings. Both systems are in common use and both have their advantages. By photographing the vibration wave with the oscillograph a permanent record is obtained which can be filed if desired. In cases where one resonant vibration stands out above the other vibrations it is not difficult to read the amplitude using a transparent calibrated scale. However, where there are several vibrations mixed in together the job of sorting out the frequencies is quite a difficult problem. There are two other objections to the use of the oscillograph:



John Tyler, Lycoming, presenting a paper on "Aircraft Engine Installation Vibration Problems"

1. The operator must develop his film in order to analyze his data.
2. The record he makes is only a small sample of a continuously varying phenomenon.

On the other hand the harmonic analyzer is continuous reading from a meter and a dial. If it seems desirable, the data can be plotted in curve form as they are taken, and when the run is finished the operator can go back and obtain more data at critical points on the curve. The various frequencies are automatically sorted out as the data

are taken. When the test is finished a curve of vibration amplitude vs. r.p.m. is available for each of several different frequencies.

The proper method of suppressing resonant vibration is to design so that critical speeds are outside the operating speed range or design to make the excitation ineffective in producing resonance.

An engine mount really has two functions as far as vibration is concerned:

(1) It must insulate the vibrations inherent in the installation from the airplane structure. This is done most successfully by using lots of rubber. Just how the rubber is shaped makes little difference as long as it is not preloaded too heavily and has as much distance between the metal of the engine and the metal of the airplane structure as possible.

(2) The second function of the mount is to place all objectionable resonance frequencies of the engine with respect to the airplane out of the operating speed range, preferably below the operating speed range. This requires a fairly flexible mount. The resonant frequencies must be sandwiched into the range below the operating speed range so that the engine will not bounce around too much at idling and warm-up speeds.

A scheme which is receiving some



R. A. VonHake, Lockheed, in quizzical rebuttal to a questioner on his "Tooling a Medium Size Airplane Factory" paper.

attention at present is that of preloading the rubber units in the engine mount against the engine torque. The mount will then be relatively stiff at idling and warm-up speeds and when the throttle is opened for take-off, the engine torque twists the engine away from the preloading stops and the mount is very flexible. This amplitude of motion of the engine can be allowed so that it will not strike the stops too violently with the normal amount of variable distribution and occasional poor spark plugs.

Tooling An Airplane Factory

THE objective of all special tooling is to simplify production operations, reduce labor costs, and assure uniformity and interchangeability of parts, said R. A. VonHake, factory superintendent of Lockheed Aircraft Corporation, in a paper on "Tooling a Medium-Sized Airplane Factory." Naturally there are always some parts which cannot be made without some sort of jig or fixture. It takes skill to produce jigs that are substantial and accurate and that permit the greatest freedom of action or accessibility for the workman producing the parts. There are borderline cases which require considerable study to determine whether the part cannot be made as economically on a standard machine without a jig as it can be made on another machine and absorb the cost of a jig.

For sheet-metal-parts production many standard sheet-metal machines are employed, such as squaring shears, circular shears, scroll shears, slitting shears, band saws, power-press brakes, tinnery brakes, punch presses, rolling

machines, bead-ers, welding equipment, etc. In working sheet aluminum, standard wood-working machinery, such as wood band saws, shapers, jointers, routers, table rotary saws, sanders, etc., are practically indispensable. For the major part of this work, flat patterns and templates must

be developed and laid out. Hand forming of irregular-shaped parts over wood or metal forming blocks usually requires a special block for each part. If a very limited number of parts are to be produced, a wood block will be found adequate. The life of wood forming blocks depends upon the thickness of the material to be formed, but it rarely exceeds five or ten sets of parts, and for larger quantities, steel or zinc blocks must be used. It has been found economical to develop templates for forming blocks.

Punch presses play an important role in sheet-metal production, and all aircraft shops usually have a variety of these. Unfortunately, the scale of production is so limited that the full value of such presses cannot be realized. Usually obsolescence of the parts occurs long before the die has passed its useful life. In spite of these limitations, punch presses are indispensable for airplane sheet-metal production.

During the last three or four years, the drop hammer has become one of the most important forming tools for sheet-metal parts. The lead and zinc dies required are quite inexpensive. They are cast from plaster or wood patterns that are usually quickly and easily made. In most cases only the female form requires a pattern, and this is cast in zinc. After cooling, a rough box is built around the form, several inches above its upper edges, and the lead male form is poured into it. The setting of the dies is quite simple. Both dies are placed in position in the drop hammer, the male die being bolted to the hammer above and the female die held in position by pouring about an inch or a little less of lead around the base over the surface of the anvil. There are usually several holes an inch or so deep in the anvil which lock the lead in place and prevent the die from shifting. Many intricate irregular parts can be easily made in a drop hammer, and almost

Commander F. W. Pennoyer, San Diego Naval Aircraft Station, applauds a speaker at the Factory and Equipment Session



invariably parts so made are much superior in appearance to hand-formed parts.

Another large tool which has increased in usage of late is the hydraulic press. It is used in conjunction with a thick rubber pad for forming irregular parts over metal form blocks. There are several large manufacturers of presses and a vast range of sizes. The size required will depend on the size of the parts to be formed. When smaller parts are formed, several can be made in one operation. Here, again, the nature of the airplane detail design will determine the size of the tool.

There are usually great numbers of small standard tools such as electric or air hand drills, air riveting hammers, air rivet squeezers, electric screw and nut drivers. There are many makes, shapes, and sizes which satisfy most of the normal requirements for

C. E. Stryker, (right) Curtiss-Wright Technical Institute, was so busy as chairman of the general committee in charge of the meeting that an attempt to photograph him resulted in a double exposure



such tools. There are oftentimes special accessory tools or attachments devised to accommodate some special or unusual conditions.

Selecting Oil for Aircraft

A. L. BEALL of Wright Aeronautical Corp. described a method of selecting an oil for use in high-output aircraft engines by full-scale engine tests. The test is preferably combined with tests to determine some other factor in engine design or material. For a minimum test, 50 hours' operation with an output of at least 0.40 hp. per cu. in. displacement is suggested, and it is stated that test routines prescribed by military services are frequently employed.

After the test the engine is torn down and carefully inspected for the wear of parts, carbon, gum and sludge accumulations, and general cleanliness. The tapered face of the compression rings offers a rapid and quite accurate gage of wear as compared with bearings or cylinder barrels and thus permits the rating of oils which prevent any measurable wear in much of the engine in the 50-hour running time. Carbon in ring grooves, sludge or gum in piston reliefs are noted. The accumulation under the piston head, varnish coatings on the connecting rods, appearance and wear of reduction gears and bushings, sludge in the crankcase and in the cavity in the crankshaft are also recorded, and together with significant wear measurements make up an evaluation of the effects of the oil on the engine. To simplify the recording of the results of the inspection and to reduce the results of the inspection to a single figure for purposes of ready comparison, each section of the engine is given an optimum or par score and the in-

spector penalizes this value of the perfect score as he proceeds for each detail which is below an optimum value established. For convenience, the engine is divided into sections such as pistons, piston rings and cylinder barrels, crank system and bushings, and values are determined for each section which, when totalled, represent an arithmetical figure for the engine inspection.

A complete chemical analysis is made of the new oil and the last sample

of used oil taken from the engine at the end of the test. The samples of used oil taken at 5-hour intervals are mixed with precipitation naphtha and filtered through a crucible, after which they are weighed to determine the naphtha insolubles, and then the residue is filtered with chloroform and again weighed to determine what of the naphtha-insoluble is chloroform-soluble. The results of the two determinations are reported as sludge and asphaltene contents respectively. The viscosity of the used oil samples at 210 deg. F. and the neutralization values are determined to find the increase in viscosity and in acidity with use.

The accumulated sludge and asphaltenes for 15 and 50-hour periods of the test are compared with arbitrarily selected optimum or par figures, and the used oil inspection results reduced to a single arithmetical figure.



"A registered nurse, she applied curl papers; a stewardess, she hunted for false teeth." Miss Marceline Garvis, United Airlines, one of three airline hostesses who enlivened the banquet with tales of experiences aloft.

At the completion of the test the following data are available for the appraisal of the performance of the oil: The graphic log of the test conditions, the engine-inspection results, and the used-oil results.

Obviously, differences in test conditions will affect the test results, and for this reason both engine-inspection and used-oil results are introduced in equations based on experience which take account of the specific output, the

oil-entering temperature and the rise of oil temperature in passing through the engine. Engine-inspection results are given twice the weight of used-oil-analysis results. When qualifications have been thus applied to the test results, the several values are reduced to a single figure called the point score of the oil. Complete details of the method of rating the results of the test were given in an Appendix to the paper.

Spot Welding

SPOT welding has come into general use in the aircraft industry during the past four years, according to Bruce Burns, who read a paper on its applications in this field. There are four reasons for this. On certain classes of work it permits substantial economy over any other method of joining metallic sheets together. On the interior fittings of passenger-carrying airplanes, the smooth surfaces of panels or assemblies fabricated by spot welding is of definite aesthetic value. The elimination of projecting rivet heads on outside surfaces of the ship reduces the drag and improves boundary-layer conditions. However, this application is permissible only if a careful analysis of the stress conditions and of the stress-resisting characteristics of the spot-weld justify it. Finally, with certain materials, such as

the corrosion-resistant steels, spotwelding is usually the most economical method of joining, and for the lighter gages of these materials it is the only practical method.

One manufacturer who has been using spotwelding of the aluminum alloys and corrosion resistant steels on a production basis for some four years averages about 15,000 spotwelds per



Bruce Burns, Northrop designer who appears in the lower corner of the picture above spoke on aircraft spot welding at the Factory and Equipment Session.



C. H. Schildhauer, Pan American, presenting "Maintenance Problems of Trans-Oceanic Flying Boats"



(Left) Hall Hibbard, Lockheed vice-president, was chairman of the Production Design Session

airplane; on some production models over 25,000 spotwelds per ship are used. Twenty-five per cent of this work is done at speeds of 500 to 1200 spots per minute.

Spotwelding costs may vary over a wide range, depending upon the materials being welded, the type of equipment in use, the complexity of the assembly, special tooling and the type of welding desired. Certain materials, notably the strong aluminum alloys,

require complete removal of the more or less tenacious oxide film before welding. Others of the aluminum alloy require partial removal of the film from all of the surfaces, or removal of all of the film from some of the surfaces, and the stainless steels require removal of all foreign matter, such as pigments in identifying inks and paints, dirt-bearing oil or grease, and free dirt or dust. The operating speed of spot-

(Turn to page 557, please)



Tapping a 30-ton reverberatory aluminum furnace at the Bohn Aluminum foundry in Detroit.

Production Lines

Takes Time

Last year in our Chautauqua discussion of what goes on behind the scenes in automotive plants, we mentioned some of the activity involved in the development of new cars. Some figures along this line were given recently by H. T. Youngren, Olds chief engineer. For example, the 1937 Olds line has been under preparation for 18 months. It seems that roof dies alone require 10 months to build and spot. The new brakes were tested for 700,000 miles before being released for production while the new water pump had 900,000 miles of service before it was OK'd. Here indeed is an absorbing side light on what it takes to build a new car.

Automatic Gear

Most interesting experience in years was that of driving a well-known low-priced car equipped with an improved Banker automatic transmission which Mr. Banker drove to Detroit recently. There are several schools of thought on the matter of automatic shifting—some want a unit that does the thinking and shifts in accordance with torque requirements. The Banker unit is the other type. Here the shift is at the control of the driver, the only control being the accelerator pedal. As you start, you can go through the gears simply by treading on the pedal; releasing the pedal and then treading on it put you into the gear. You can shift back into second any time by

stepping on a button which makes engagement through mechanical linkage.

This car also was fitted with an overdrive attachment which is placed in operation by pulling out a dash board handle while the car is in gear or when stopped. Thus we have no controls of any kind for purely automatic operation and yet fully within the driver's control. It's really a thrilling experience to drive this car. And the present transmission and clutch already have given 80,000 miles of service.

Watch Depreciation

One of the most serious implications of the Revenue Act of 1936 is the proper treatment of the machinery depreciation account. Now more than ever it is necessary to keep an accurate record of all production equipment and to set up correct depreciation rates. This has been the subject of much discussion in the past but never before has the handling of this element been so important.

By Injection

Some time within a month we expect to have a complete story on a comprehensive line of injection equipment built by a prominent carburetor manufacturer. There is one type for Diesel engines; another type for gasoline engines of every variety including aircraft.

Synthetic Resin

Synthetic base finishes appear to be making great headway. They have been standard on Ford and Plymouth and have been adopted for another low-priced job that will be announced at Show time. One of the higher-priced lines is using Dulux for finishing the wheels. This seems to be a very wise move for disc wheel finish since the synthetic material has the reputation of possessing great hardness and resistance to abrasion.

Procedure Handbook

A new issue of the well-known and widely used "Procedure Handbook of Arc Welding" has been announced by the Lincoln Electric Co. While the book retains its familiar form and content, the following new data have been included to bring the art up to date—selection of type of joint, characteristics of welding generator, sheet metal welding, effect of electrode size on cost, monel metal, 4-6 chrome steel, and many other items.

Automatic Transmission

Indications are that there may be considerable activity in automatic transmissions during the course of the next few months. In fact, we understand that a very important organization is about ready to spill the whole story.

Wood Molding

One of the higher priced lines has as a feature, wood window garnish moldings. This makes for a rather unusual and most attractive interior finish.—J. G.

MANUFACTURING
MANAGEMENT
METALLURGY

Metal Exposition and Congress

By Philip H. Smith

A COLORFUL show—a show so striking in its general use of lighting effects and dynamic exhibits that it set a standard for trade exhibitions that will be hard to surpass. That's the eighteenth annual National Metal Exposition, held in conjunction with the National Metal Congress in the Auditorium at Cleveland, Oct. 19 to 23.

There were motion pictures, stages where the various phases of metal production were portrayed in miniature electro-plating, welding operations and flame cutting to watch and an occasional sniff of burning metal to heighten the sense of unreality already created by great showmanship in the handling of color and light in exhibit after exhibit.

"What do you think this show must have cost?" was the oft repeated question and as an answer was not forthcoming the question would be followed promptly by a statement that the show certainly reflected better times and greater interest.

Between the five-day consolidated program of the American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers and the Wire Association, and the show itself, members of the automotive industry found much from which to profit. And to judge from the all-time record attendance the industry was well represented by those who wished to hear the latest about deep drawing of steel axles, gears and axle shafts.

Among the many papers delivered there were three which related to axles. One slant was given by T. V. Buckwalter, vice-president, and O. J. Horger, research engineer, of the Timken Roller Bearing Co., in a paper which told of an investigation to determine the weakening effect caused by the presence of press-fitted members on the fatigue strength of axles, and to study the strengthening obtained by surface rolling. According to Mr. Buckwalter this investigation was prompted by the many failures in recent years in axles with press-fit assemblies or shrunk on members, due to the increased severity in service conditions.

As a result of these studies, it was discovered that: "A press-fit member

reduces the fatigue strength of an axle to less than half the strength of a similar axle not having a press-fitted member," and that, "by surface rolling the axle at the press-fitted section it is possible to more than double the fatigue strength of the usual press-fitted axle assembly. Thus surface rolling permits the use of press-fitted assemblies having about the same strength in plain axles which do not have a press-fitted member."

Another phase of this investigation was to determine how reliable small specimens were in obtaining data applicable to large specimens. The above mentioned tests were made on 2-in. di-

ameter axles and that raised the questions, "will the favorable effect of surface rolling be as great for larger size axles?" and "how does the fatigue strength of specimens vary with size of specimens having different forms of stress concentration?" The answers were not forthcoming, but Mr. Buckwalter announced that Timken is building a fatigue testing machine with a capacity sufficient to test axles of 13½ inches diameter, for the purpose of determining the answers to these and other questions, such as those relating to forging and heat treating practice and the general problems associated with large sections.

Tests of axles and axle steels to determine the best type of steel and the



Reaches New Height of Interest

best combination of physical properties were described in detail by H. B. Knowlton, metallurgical engineer, Gas Power Engineering Department, International Harvester Co. Pointing out that the investigation had been concerned with tractor axles, but that it is believed that some of the fundamentals apply to many other parts, he said:

"There is no mathematical formula which can be used to determine the best type of steel or the best combination of physical properties for all parts. The selection of the steel and the physical properties depends upon the design of the part and the type of service to be encountered.

"Truck and pleasure car axles are usually designed so that there is a neck

near the spline end, which is smaller than the pitch diameter and sometimes smaller than the root diameter of the spline portion. Such a design may cause the failures to occur in neck rather than in the spline. It has been found, however, that when some of the tractor axles are designed this way, the strength as determined by the static torsion test is somewhat lower. It may be, however, that such an axle would have a higher resistance to shock and fatigue, although this point has not been definitely established. It must also be remembered that producing a neck in the axle, either by forging or machining, may mean an increase in the cost of the product."

In evaluating steel for use in rear

axle gears, there is less chance for error in selecting the best if selection is made on the basis of tests made at 250 deg. Fahr. in hot oil rather than on the basis of tests made at room temperature. This statement was made by A. L. Boegehold, metallurgist, Research Laboratories Section, General Motors Corp., as an outcome of tests made on notched test bars heated by oil at 250 deg. Fahr. His summarized findings follow:

"Resistance to fatigue of hardened carburized steel is considerably less at 250 deg. Fahr. than at room temperature.

"The fatigue life in terms of cycles till failure, which is the usual way of measuring the life of rear axle gears, is as much as 1500 per cent greater at room temperature than at 250 deg. Fahr.

"The structure obtained by box quenching after carburizing has considerably less fatigue resistance than that obtained by a double treatment including box quenching or cooling in the box followed by reheating to a temperature above the A_c and quenching.

"Work hardening of an austenitic structure appears to make it more resistant to fatigue in contact with hot oil.

"The reason for the loss of durability at a temperature of 250 deg. Fahr. was not discovered, but the indications are that it is not a consequence of corrosion or of any structural change of sufficient magnitude to affect the indentation or file hardness nor the structure as revealed by a magnification of 500 diameters."

Deep drawing of steel came up for consideration with the presentation of a paper by Joseph Winlock, chief metallurgist, and Ralph W. E. Leiter, research metallurgist, of the Edward G. Budd Mfg. Co. Discussing the progress made in throwing additional light upon some of the factors influencing the formation of Luder's lines of "stretcher strains," Mr. Winlock said in part:

"It appears to us that the rate or rates of work-strengthening remain constant for any given steel and that this rate is substantially independent of the stress at which plastic slip commences. In other words, as the stress necessary to initiate plastic slip increases, the tendency for necking to take place increases also. Stretcher

(Turn to page 559, please)



Hudson and Terraplane Longer

By Joseph Geschelin

HUDSON MOTOR CAR CO. this year is offering three lines of Hudson cars, two eights and one six, and a Terraplane Six in both DeLuxe and Super models. Wheelbases of all cars have been increased 2 in. over last year, on the Hudson Eights to 129 and 122 in., on the Hudson Six to 122 in. and on the Terraplane to 117 in.

Bodies are new and of all-steel construction, with steel roof. While the styling follows the lines established last year, some changes have been made at the front end, the new models having deeper front fenders and shell-mounted headlamps, and a stainless-steel radiator center section replaces the die-cast section used last year.

There is a complete line of body models for each of the two Hudson

chassis with 122-in. wheelbase, while the 129-in.-wheelbase Hudson comes in only two body types, a sedan and a touring sedan. Rumble-seat coupes have been entirely discontinued and the smaller coupes seat three passengers. There is also a four-passenger coupe with a transverse seat back of the front seat. The convertible coupe is also of four-passenger capacity. A complete range of models is offered on both the DeLuxe and the Super Terraplane chassis. New this year is the sport convertible brougham which comes on the Super chassis.

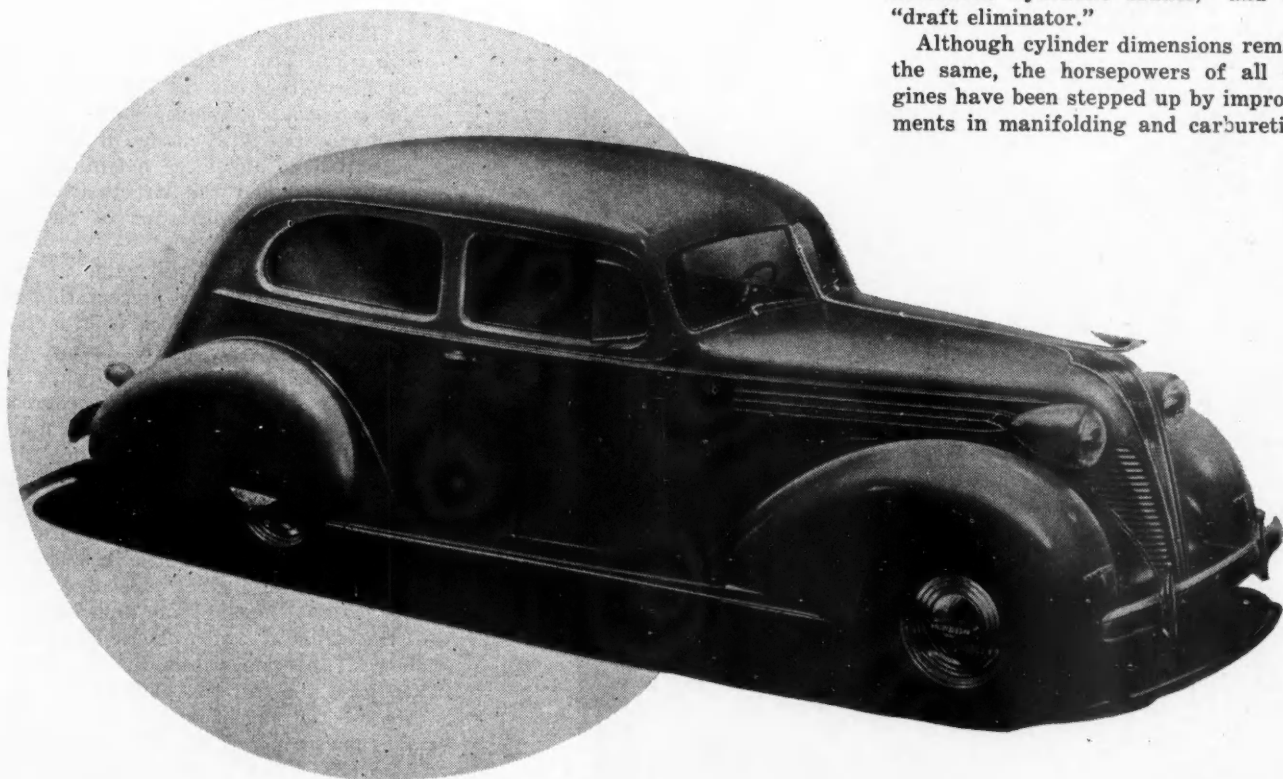
New double-drop frames are used, with two X members, one extending from the forward end back to the rear

engine supports, the other located at the center. This latter has a boxed and welded center section and rear arms gusseted to the side rails. A steel underbody, fastened to the frame at 38 points, adds to the rigidity of the complete structure. With the exception of the Hudson convertible coupe and convertible brougham, all bodies are of all-steel construction; they are wider and roomier than last year and although the overall height is 2 in. less, there is more head room.

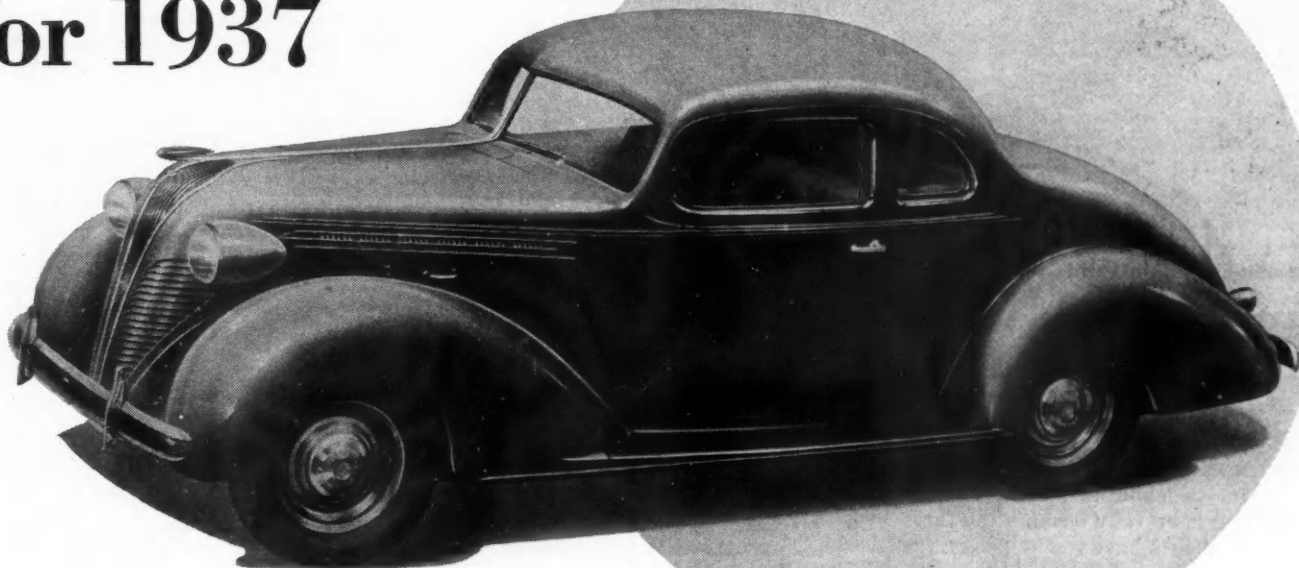
Three major items of optional equipment are being offered on all lines this year, viz., the Electric Hand, introduced by Hudson two years ago; a new selective, automatic-shift transmission, and the Hill-holder, which latter, in conjunction with the hydraulic brake system, keeps the car from rolling backward down hill. The chief mechanical features introduced by Hudson last year are retained in improved form, including the "radial safety control," "duo-automatic hydraulic brakes," and the "draft eliminator."

Although cylinder dimensions remain the same, the horsepowers of all engines have been stepped up by improvements in manifolding and carburetion.

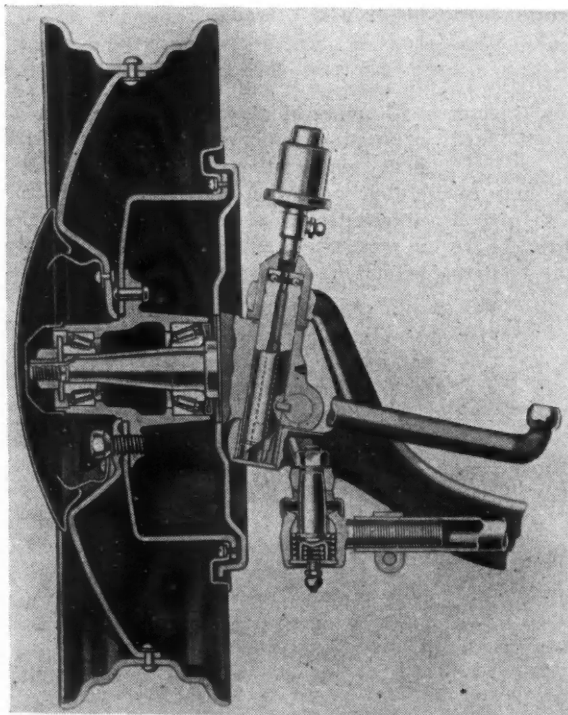
Hudson brougham



for 1937



Terraplane DeLuxe victoria four-passenger coupe



Terraplane front-axle end

The Hudson eight-cylinder engine of 3-in. bore by 4½-in. stroke (254.5 cu. in. displacement) is rated 122 hp. at 4200 r.p.m., with a standard compression ratio of 6.25. The engine in the Hudson Six, with 3 by 5-in. cylinders (212 cu. in. displacement) is rated 101 hp. at 4000 r.p.m., with the standard compression ratio of 6.25 and an iron head; with an aluminum head and a compression

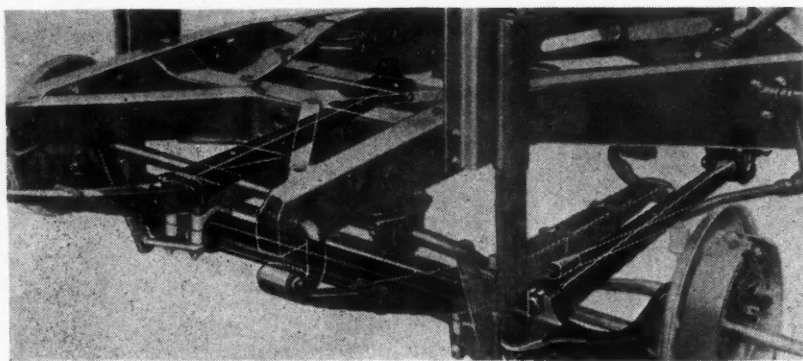
ratio of 7, this engine is rated 107 hp. at 4000 r.p.m.

The Terraplane engine has the same cylinder dimensions and displacement as the Hudson Six; but it is offered in two distinct types. On DeLuxe models the engine is fitted with the Carter single-throat carburetor, as last year, and is rated 96 hp. with a 6.25 compression ratio and cast-iron head—an increase

of 8 hp. The same engine fitted with an aluminum head with a compression ratio of 7, has a rating of 102 hp. A hand-operated choke is standard on Terraplane DeLuxe models.

On the Terraplane Super models the engine is fitted with the new Carter dual downdraft carburetor and new manifolding which boosts the rating to 101 hp. with the standard iron head and a compression ratio of 6.25. When fitted with an aluminum head with a compression ratio of 7, this engine is rated 107 hp. Despite better acceleration and increased top speed, the fuel mileage is said to be improved 10 per cent over last year. The double downdraft carburetor on the Super Terraplanes is equipped with an automatic choke, a thermostatic heat control, a back-fire arrester, an air cleaner, a dash-pot throttle control, and a vapor-relief valve.

All Hudson engines also have the Carter double downdraft carburetor with single float bowl. On the eight, one barrel feeds the four center cylinders and the other the four outer ones. On the six, one barrel feeds cylinders Nos.



Front-axle radius rods serving as anti-sway members (also shock-absorber mounting)

1, 2, and 3, the other Nos. 4, 5, and 6. The carburetor is provided with an antipercolating device and an unloader in the intake manifold which permits of deflooding it by fully opening the throttle. All models have a new larger fuel pump with a capacity of 40 gals. per hour at 1950 r.p.m. of the engine. Fuel lines are cooled by the air stream. An automatic choke is standard equipment on Hudsons. A vacuum booster unit combined with the fuel pump, which improves the regularity of operation of the windshield wipers, is offered as extra equipment on these cars.

On the DeLuxe Terraplane, when not equipped with radio, the generator has a maximum capacity of 16 amperes. On all other models, and on DeLuxe models equipped with radio, a generator with a capacity of 25 amperes is provided. This generator has a vibrator type voltage control unit, adjusted to approximately 7.6 volts. For greater accessibility, the battery is now located beneath the hood on the left side of the car, which location also shortens the electrical leads. The battery is cooled by the air stream in a duct beneath the hood. Headlamp bulbs are of a design which concentrates the filament more closely around the focal point of the reflector. The passing beam is now deflected two (instead of three) degrees to the right.

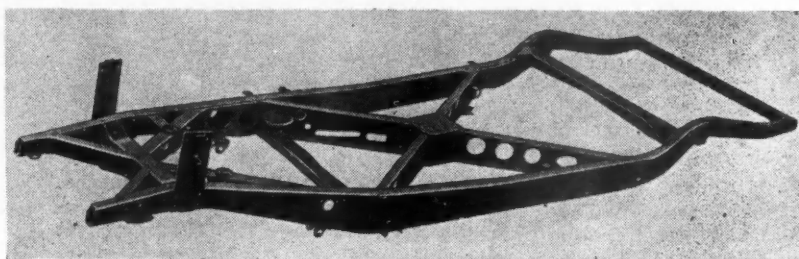
The radio speaker is mounted on the front cowl under the instrument panel. Radio antennae are mounted horizontally under both running boards. Two radios are available as extra equipment this year. One of these is similar to the set used in 1936, being a two-unit type with six tubes and an eight-inch dynamic speaker. This set has been considerably improved in selectivity. The smaller set is a single-unit device with a six-inch integral speaker. This set employs the same control head, mounted on the steering-column bracket. It has five instead of six tubes, two of

which are metal. On Hudson Custom eight models the radio is standard equipment.

On the Hudsons, a new headlamp reflector and lens are claimed to give a better concentration of the beam. There are two tail lights on the rear fenders

and a separate license-plate lamp in the center, shielded behind the bumper. The ignition distributor is said to be entirely moisture-proof now. Outside horns are furnished as extra equipment only. The standard double air horns of the Hudsons are concealed under the hood. Single horns are standard on the DeLuxe Terraplane, twin horns on the Super model.

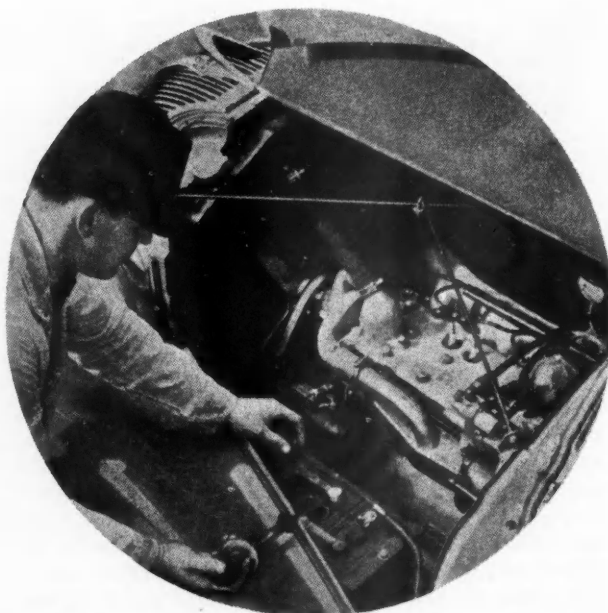
The radial arm of the "radial safety control" has been shortened slightly and the connection to the axle modified by eliminating the pivot pin. The braking system is continued without change, except that the master cylinder has been relocated and now is mounted directly in front of the bracket supporting the brake and clutch pedals.

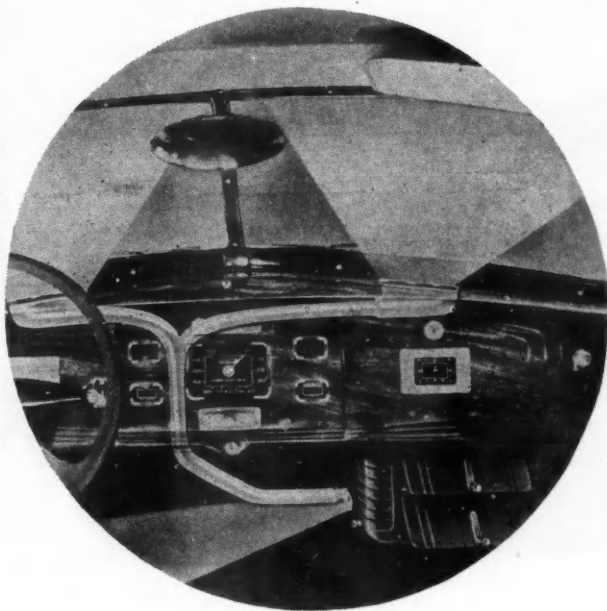


Terraplane double-drop 2-X frame

Clutches of all models continue to be of an oil-cushion, single plate type with heat-treated cork inserts. Automatic clutch actuation is available on the different cars at extra cost. With the new selective automatic shift, not only is clutch actuation entirely automatic,

Battery installation in engine compartment





Heater installation available with Hudson and Terraplane cars

but at low engine speeds—up to 15 m.p.h.—the car free-wheels, and the makers emphasize that at such speeds free-wheeling is quite desirable. The device functions whenever the foot is taken off the accelerator, and is therefore effective whenever gear changes are made.

The Electric Hand remains substantially the same, except for a change in the form of the shifter gate on the steering column, in which the reverse slot is now at an angle to the left.

The transmission, which was considerably enlarged in 1936, remains the same, except for the mounting required for the new automatic gear-shift system. Universal joints are of the roller-bearing type. On the Hudson six the propeller shaft has been increased in diameter to 2 1/4 in. Rear axles also remain the same as last year, being a semi-floating type with nickel-molybdenum-steel spiral bevel gears, and shafts of the same material. The standard gear ratio is 4 1/3 to 1, but optional gear ratios of 4 5/9, 3 8/9 and 3 5/9 are available on the Hudson and Super Terraplane models. Differential bearings are longer and bronze bushings are now provided for the pinions of the differential.

The roller-tooth steering gear used in 1936 on the larger Hudsons only, is now standard equipment on all lines. The clearance on the hour-glass type of worm is a minimum in the straight-ahead position and increases toward both extremes, so as to combine freedom from backlash in regular driving with ease of operation in parking. The steering ratio has been increased from 17 to 18.2. An external adjustment is

now provided, and the use of shims has been largely eliminated.

The master cylinder of the hydraulic brake system is now mounted on the bracket supporting the brake and clutch pedals. The Hill-holder, which is optional at extra cost, is actuated hydraulically by the same fluid used to apply the hydraulic brakes. The clutch pedal is interconnected with a valve through which the brake fluid passes in the application of the hydraulic brakes. This valve prevents the return of the brake fluid until the clutch is depressed, thereby keeping the brake

applied until the gear change has been made and the operator is ready to drive the car forward.

Front springs are longer and have a somewhat lower rate. The spring rate at the rear has been reduced to 110 lb. The direct acting shock absorbers are continued, but with a change in valve action to produce a better ride.

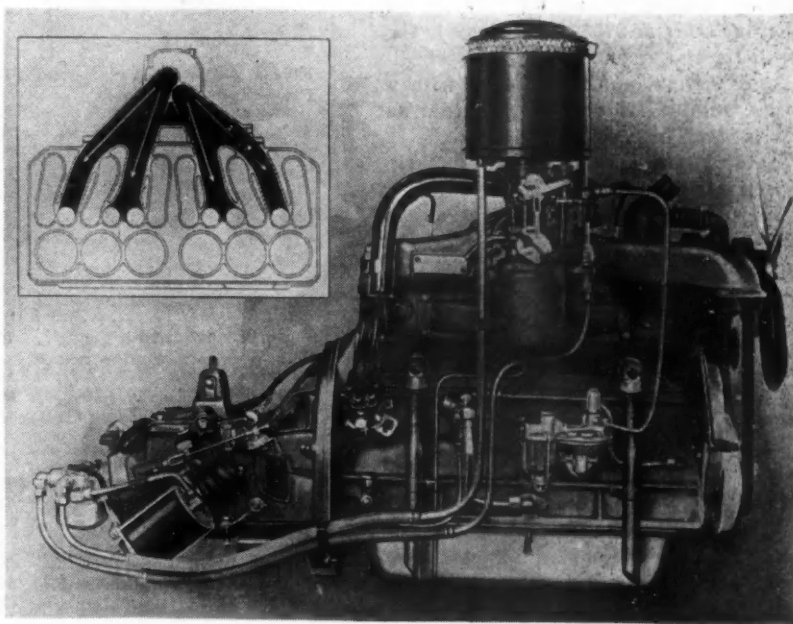
Bodies are wider by 6 in., measured at the windshield. On the Sedan, the front seat width is 5 in. greater, being 55 in.

The exterior body hardware has a "3-step" design, which is also carried out in such inside details as the instrument panel, upholstery pleating and embossing on the inside of the doors. Outer door handles are of the safety type, with both ends curved inward. Front doors are hinged at the forward side. Rear doors open from the front, the door openings being wider than in 1936.

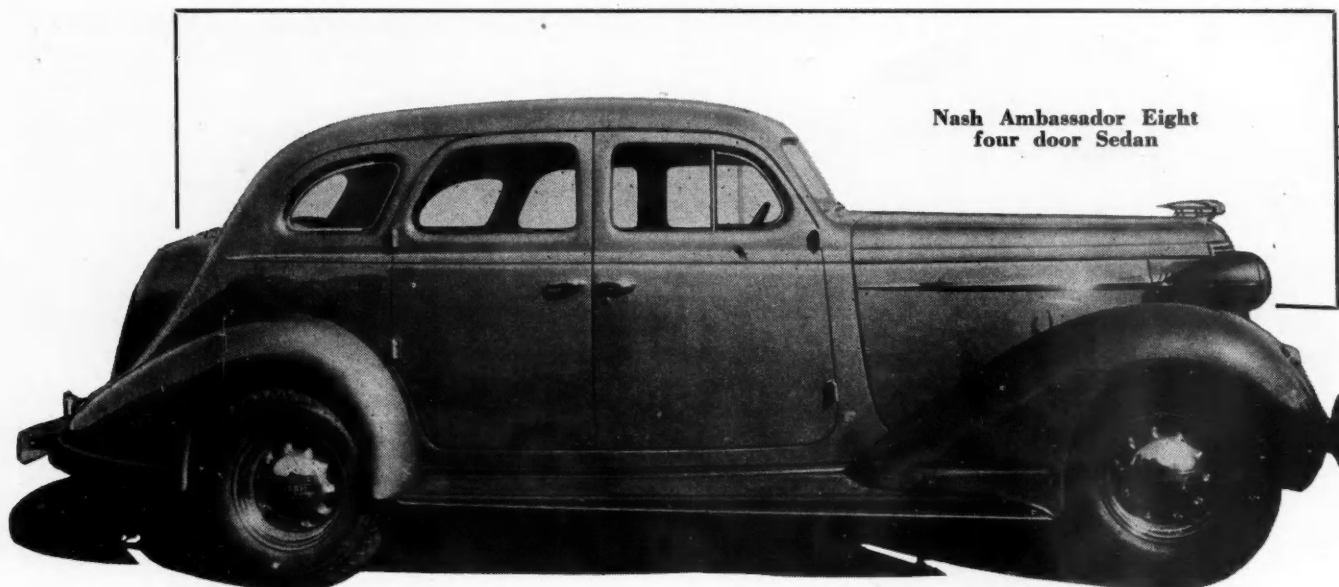
Headlamps are bracketed to the radiator shell, instead of to the fenders. Seat adjustment is improved, a gear device being used which is more accessible and smoother in action. The range of adjustment on the front seat is 4 in.

An entirely new instrument panel has been adopted, six inches wider than that used in 1936. The portion of the panel with the instruments and package compartment door is plane and vertical, instead of being curved as last year, and the instruments are lower on the panel. The ruby tell-tale lights have been replaced by small semi-opaque panels in the oil and current gages. When there is no oil pressure, the word "No" flashes in red on the oil gage, and

(Turn to page 558, please)



Inset: Distribution from dual carburetor to six-cylinder engine. Side view of powerplant with "Electric Hand" installation



Nash Ambassador Eight
four door Sedan

Nash Offers Three

THREE lines of Nash and Nash-Lafayette cars are being offered by Nash Motors Co. for 1937, with price reductions on some of the models. Bodies for all three lines have been redesigned and are being made from new dies. The leading line is the Ambassador Eight, which has a 125-in. wheelbase and is equipped with an eight-cylinder, valve-in-head, twin-ignition engine of 105 hp. The base price on this line is \$855. Next comes the Nash Ambassador Six with 121 in. wheelbase (4 in. less than last year) and a six-cylinder, valve-in-head, twin-ignition engine of 95 hp. Prices on this line start at \$755. Last there is the Nash Lafayette 400, which has a wheelbase of 117 in. and is equipped with a 90-hp. engine. This model is priced as low as \$595 at the factory.

Referring to the new bodies, their comfort is enhanced by elbow recesses provided in the rear seats, by a relocation of the brake and shift levers in the driver's compartment, and by raising the rear section of the top. The transmission channel in the floor of the car has been eliminated.

There are no louvers in the hoods of the new Nash models, tests by the engineering department having shown that elimination of the louvers did not increase the engine operating temperature.

A Nash-Lafayette innovation of last year, whereby a full-size bed could be made in that car, has now been extended to the Ambassador models, and the arrangement has at the same time been simplified.

All of the new models have ride stabilizers. The Ambassador lines are equipped with an improved synchro-

shift transmission. On the standard Nash-Lafayette, where the horse power/weight ratio has been increased by increasing the engine output, the rear axle ratio has been decreased from 4.44 to 4.10, and all Nash models now have the same rear-axle ratio.

The "synchronized springing" feature introduced by Nash last year (equal suspension frequency for both front and rear) is continued. The springs have pre-lubricated inserts between the three long rubber leaves at their ends, which eliminates metallic contact there. In addition, the new springs are packed with a lubricant whose viscosity is said to be unaffected by temperature. The springs are packed with the new lubricant at the factory and are then sealed by canvas covers, which in turn are fitted with metal covers.

The overdrive is again being offered as an optional extra on Nash Lafayette cars. Cars equipped with overdrive this year come with special speedometer dials which indicate not only the car speed in m.p.h., but also the engine speed with the car in overdrive.

A pilot light on the instrument panel indicates when the headlamp beam is high (for driving). Vents at the top of the panel provide for defrosting the windshield in case a car heater is fitted.

Body and engine features of the two Nash Ambassador models are substan-

1937 Prices

Ambassador Eight

Five-window business coupe.	\$855
Five-window rumble seat coupe	895
Victoria with trunk	895
Four-door, six window sedan with trunk	945
Cabriolet, fully convertible..	960

Ambassador Six

Five-window business coupe.	755
Five-window rumble seat coupe	795
Victoria with trunk	795
Four-door, six-window sedan with trunk	845
Cabriolet	860

Nash—Lafayette

Five-window business coupe.	\$595
Five-window rumble seat coupe	650
Cabriolet	740
Victoria with trunk	655
Four-door, six-window sedan with trunk	700

tially identical. The grille is composed of vertical bars, set off near the top by cross bars bearing the Nash nameplate. Long "tear-drop" headlamps are mounted in a high and forward position on the hood. Chrome fins on the headlamps distinguish the eight-cylinder model from the Six, another distinguishing feature of the Eight being the streamlined radiator ornament. The treatment of the rear trunks is also different on the two models.

trally at the rear of the trunk. A light on the trunk serves the double purpose of illuminating the license plate at night and lighting up the interior of the luggage compartment.

Instrument panels on Ambassador models are finished in a mahogany grain and trimmed with oxidized silver. The speedometer and other instruments are grouped directly in front of the driver. At the extreme right is a package compartment, on the door of

massive design, chromium-plated. Bodies of the Ambassador models measure 52½ in. in width at the front seats and 49 in. at the rear seat, thus affording ample room for six passengers. Headroom also has been increased to 38 in. at the front seat and 39 in. at the rear.

Hydraulic brakes are standard on all models and a new brake lining is used. Steel disc and spoked wheels are obtainable at the customer's option.

Lines With New Bodies

Fenders are now of heavier-gage steel and have a V-shaped crown. There are stainless steel trim moldings on both sides of the radiator shell between fender and hood. Parking lights, mounted in each front fender, are also decorated with stainless steel moldings.

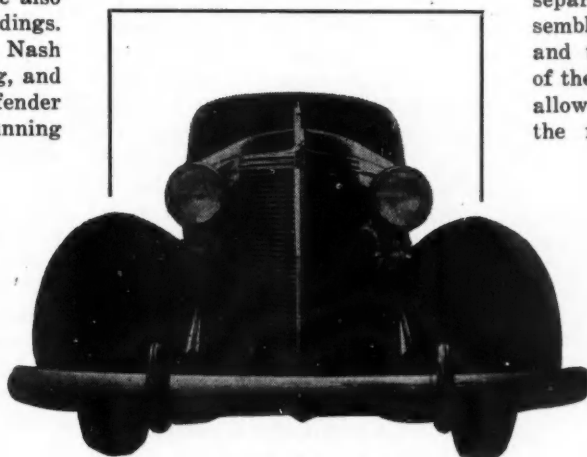
Running boards on the 1937 Nash Lafayette cars are unusually long, and the entire rear half of the front fender is securely attached to the running board. A space left between the rear fender and running board facilitates draining and cleaning.

The windshield is of the divided V type. There are drip moldings over the window frames. Tops are reinforced by steel bows to prevent drumming. The luggage capacity of the Nash Lafayette has been increased, and the tire compartment, which is separated by a shelf from the luggage space, permits removal of the tire without disturbing the luggage.

It is now unnecessary to remove the rear-seat back cushion when making up the bed. The back is hinged at the top and can be swung upward on braces, serving as a shelf for clothing, as Pullman berths.

The license bracket is located cen-

trally at the rear of the trunk. A light on the trunk serves the double purpose of illuminating the license plate at night and lighting up the interior of the luggage compartment.



Front end of the Nash—
Lafayette "400"

terior of the compartment. Radio controls may be mounted at the center of the instrument board.

Broadcloth upholstery is standard, but mohair is optional on all models. Window moldings are mahogany-grained. Interior hardware is of a new

A new engine mounting has been worked out for use on all models. There is a single support at the forward end, just below the fan bracket. The front mounting consists of two steel sleeves separated by a rubber sleeve, which assembly is interposed between the engine and the frame. The cylindrical form of the supporting members is claimed to allow the engine to rock freely, while the rubber cushion allows sufficient vertical movement to absorb all vibration. At the rear the engine is mounted on two rubber biscuits, and these are well below the level of the front mounting.

Safety glass is standard throughout on all Ambassador models.

The radiator grille of the Nash Lafayette is die-cast and chromium-plated, and has horizontal instead of vertical bars. Fenders are of heavier-gage metal than previously used and have a V-shaped crown.

The running boards are of the new long design, and there is 1½ in. more headroom at the rear seat. Drip moldings are another new feature of the Lafayette. The trunk is equipped with the center-mounted license bracket. Instrument equipment is the same as on the Ambassadors.—P. M. H.

Rear-Engine, Front-Drive Car Described by Ford in Patent Specification

A PATENT issued to Henry Ford and assigned by him to the Ford Motor Co. (U. S. Patent No. 2,051,474, issued Aug. 18, 1936) bears the title Motor Vehicle Brake, but the

specification seems to indicate that the original application had a wider scope, for in the introduction the applicant stated: "The object of my invention is to provide a motor vehicle wherein the arrangement of chassis elements is especially adapted for use in connection with a vehicle body of streamlined shape. The body *per se* forms no part of my invention, the novel design and arrangement of the elements which make the use of such body more practical constituting my invention."

The inventor continued:

"What is believed to be a novel characteristic of my vehicle construction is that the motor is disposed directly over the rear axle, there being a drive shaft and torque tube extending therefrom forwardly to the front axle which is driven by the motor. Several advantages arise from this construction, the first being that the seating arrangement of the vehicle may be materially improved, it being possible to place the seats well forwardly of the positions occupied by the seats in the conventional car, so that the passengers are disposed substantially at a point intermediate of the front and rear axles. The vertical movement or bouncing of the passengers due to road irregularities on the wheels is materially lessened for this reason.

"Further, this construction incorporates all of the inherent advantages of vehicles having the torque tube type of drive. Still further, the applicant's con-

struction differs from the many designs of rear-engined cars in that his engine is placed directly over the rear axle, whereas in all of such vehicles with which applicant is familiar the engine is placed either forwardly or rearwardly of the rear axle. It will be apparent that when the engine is placed forwardly of the rear axle an excessive wheel base length is required to provide for a given passenger compartment area while, when the engine is placed rearwardly of the rear axle then an excessive length of the vehicle is required or else the rear wheels must be placed directly under the rear seat of the car. It is believed that only when the engine is placed directly above the rear axle that the most desirable seating arrangement, wheel base, and length of body can be obtained.

"It has been proposed in the past to place an engine directly above the rear axle of a vehicle and to transmit the engine torque through a return gear box, disposed forwardly of the engine, rearwardly beneath the engine to the rear axle. Aside from the disadvantage in cost and inefficiency of the return gear box, such device has a further disadvantage in that the clearance required for the driving axle on such a unit necessitates placing the motor a considerable distance higher in the frame than is required where a 'dead' axle is employed. Such a dead axle may be bowed downwardly at its center,

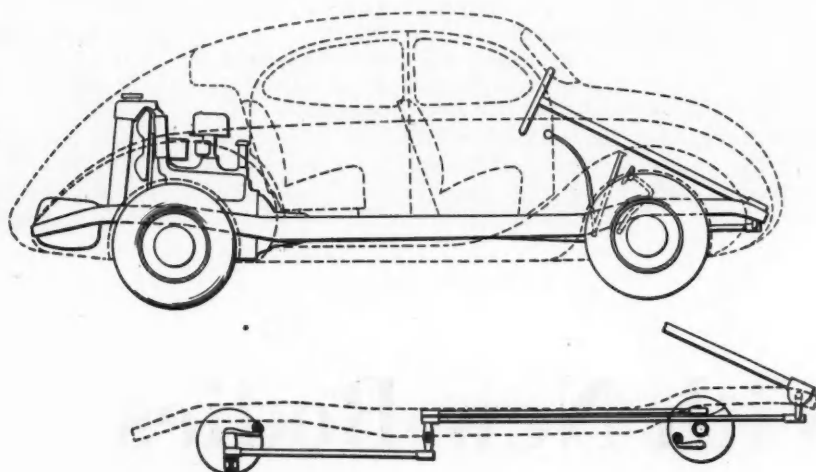
of course, to clear the motor when same is placed in a very low position. Consequently, with the arrangement shown a very low center of gravity is obtained together with an ideal seating arrangement, car length and weight distribution.

"A further object of my invention is to provide a front wheel drive vehicle wherein both the front and rear wheels are simultaneously pivoted to steer the car. The vehicle is believed unique in that about 60 per cent of the steering is accomplished by the front wheels with only 40 per cent resulting from the rear wheels. This construction permits a short turning radius with a permissible angular movement of the front driving wheel universal joints while at the same time the rear end of the car, being moved laterally to a lesser degree than the front wheels, is prevented from swinging in toward the object away from which the front end of the car is being steered. This arrangement eliminates a major inherent defect in all other four-wheel steered vehicles of which the applicant is familiar.

"Still a further object of my invention is to provide an improved brake hook-up whereby the brakes on all four wheels are simultaneously operated."

From the foregoing introduction to the specifications it would appear that the invention covered the general chassis lay-out. The patent, however, has only a single claim and that covers "a mechanism for operating the brakes of a steerable vehicle."

It may be pointed out that the patent was issued on an application filed March 19, 1934.



Aircraft Production Meeting Spot Welding

(Continued from page 546)

welders may vary from 30 spots per minute in the case of earlier types of equipment to 1500 or 1800 spots per minute in the case of well built roll welding equipment operating in conjunction with synchronous tube timers. The complexity or size of the assembly is obviously an important factor; it is not uncommon to find small but complex units which require several successive machine set-ups and actually more time in changing set-ups than in productive welding. Well-designed jigs and fixtures often increase output per man-hour several hundred per cent. The type of welding required influences the operator's output; if, for reasons of appearance or stress distribution, he must place his individual spot welds with accurate spacings on predetermined lines, he cannot work as rapidly as when he may space and locate spot-weld positions by eye.

Aircraft Inspection for Airworthiness

INSPECTION of aircraft for airworthiness must begin where the aircraft itself begins, that is, in drawings and stress analysis, according to Richard C. Gazley of the Bureau of Air Commerce, who presented a paper. As to physical inspection, it must start with the raw materials, and since slips in production processes would result in unsafe conditions, the inspection must continue through every factory process. Now, the technical staff of the Bureau of Air Commerce, which is charged with the issuance of airworthiness ratings, has neither the personnel nor the desire to observe every process on every part of every licensable aircraft, and the sense of responsibility of aircraft manufacturers must be relied upon as a substitute for detailed inspection of matters of a more or less routine nature.

A factory which is adjudged competent is granted an approved-type certificate and is subjected to inspections which are more of a supervisory than a detailed nature. This method has many advantages from the standpoint of every one concerned, and the Bureau of Air Commerce would like to see every manufacturer qualify for an approved-type certificate.

Mr. Gazley in his paper outlined what would be considered a competent and reliable factory, covering purchasing procedure, stock-handling, processes, and personnel. It was pointed

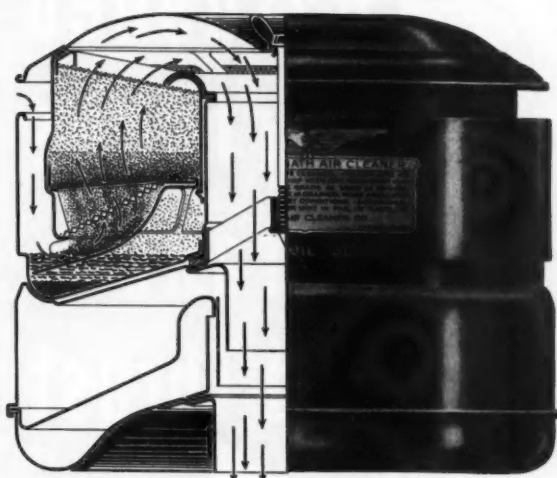
out that the rules laid down are flexible and are to serve only as a yardstick against which the actual conditions in each case can be measured.

Testing Airplanes for Airline Service

PROBLEMS in testing airplanes for airline service were discussed in a paper by M. Gould, Board of American Airlines. The large number of appliances required for the operation of the

modern transport plane, operating mechanisms such as retractable landing gears and flaps for landing, the ever increasing number of instruments and radio apparatus for operation and communication, all have made development testing of a new model a complicated and long drawn out procedure lasting over several months before the plane is ready to be put into service. The time required to test a modern transport off the production line has quadrupled since 1928. At that time a transport plane off a smoothly operating produc-

HIGHEST AIR CLEANING EFFICIENCY



Cut-away view of
United Oil Bath Cleaner
and Silencer.

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AND OIL BATH SILEN-
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tion floor could be adequately tested and ready for delivery in about half an hour. Today, in 1936, it requires over two hours' flying for two pilots and two or more inspectors to test completely a new twin-engined transport plane off the production floor and get it ready for delivery. This time is usually broken up into several short flights with numerous adjustments between flights.

Canadian Truck Builder Expands

Truck Engineering of Canada, Woodstock, Ont., manufacturers of truck

equipment and trailers, are moving into new premises in the old Massey-Harris factory. They will occupy 10,000 sq. ft. of space which is double their present capacity.

Hudson-Terraplane

(Continued from page 553)

when the generator is not charging the word "Not" flashes in red on the charging gage.

Hudson instrument panels are finished in walnut graining with a three-tone effect. The dash above the panels

is carried into the V of the windshield. Incorporated in the dash on the upper side is a grille communicating with an air passage below, through which hot air can be conducted from the heater if one is installed. The heater is offered as an extra. The package compartment is on the right side of the instrument panel and has a volume of 1000 cu. in.

Four-passenger coupes and brougham models are fitted with an Arcuate seat which is pivoted at the left end and can be rotated bodily around the pivot. In addition, the back of the seat tilts forward to permit of easy access to the rear compartment.

Disc wheels finished in body color, with chromium plated hub caps, are standard on Hudsons. Tire sizes remain the same—16 x 6.00 on the six and 16 x 6.25 on the eight; both sixes and eights may have 15 x 7.00 tires at extra cost.

Derivation of the Equation for the Piston Displacement Factor

FOR some time we have been printing piston-displacement factors of passenger cars in our specifications. These factors are obtained by means of the equation,

$$D.F. = \frac{D \cdot r}{W \cdot d} = 3825 \text{ — cu. in. per ton-foot,}$$

and a number of inquiries have been received as to how this equation is derived.

The displacement factor represents the number of cubic inches the pistons of the engine displace while under gas pressure. If the piston displacement of the engine is represented by D , it is evident that the displacement under gas pressure is $D/2$ per crankshaft revolution, as each piston is under gas pressure only once in two revolutions. This displacement (that is, $D/2$) must evidently be divided by the weight of the loaded vehicle in tons and by the distance in feet the car travels during one revolution of the crankshaft. As to the weight, it is our custom to add 400 lb. to the shipping weight, for occupants and supplies. The weight W being given in pounds, the weight in tons is evidently $W/2000$.

While the crankshaft makes one revolution, the driving wheels make $1/r$ revolution, r being the rear-axle ratio. This assumes that the car is being driven in direct-drive, to which condition the displacement factor as given applies. If the effective diameter of the driving wheels is d in., then the car travel per wheel revolution is $3.14 d/12$ ft. and the car travel per crank-



In Mechanics Roller Bearing Universal Joints end thrusts are carried by the large, hardened, ground, and amply lubricated journal ends. This is accomplished by fitting the ends of the cross snugly to the bottom of the journal bearings, a construction which relieves the shoulders of the thrust loads, reduces wear, materially increases the life of the joint. Long life, perfect balance and ease of assembly are but a few of the reasons why Mechanics Universal Joints are used on leading passenger cars, trucks and busses. Investigate.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner Corp. 1301 18th AVE., ROCKFORD, ILLINOIS

shaft revolution, (3.14 d)/(12 r). Therefore, the cu. in. displaced by the pistons under gas pressure, per ton moved, per foot traveled is

$$\frac{\frac{D}{2} \times 3.14 d}{12 r} = 3825 \frac{D r}{W d}$$

Horizons of Business

(Continued from page 539)

inflation spurt in the early summer of 1933, business in this country made no progress until nine old men, thinking in terms of a horse and buggy age, called the Government out of bounds in the late spring of 1935.

4. World recovery in production is at present substantially ahead of similar recovery in this country.

These are all points which it is politically safe to make. The non-political debater who can ignore votes may trace specific New Deal measures such as relief, labor policies, scarcity doctrines, the persecution of the power industry and big business generally and prove that in each case the effect was injurious, that any improvement which occurred was in spite of and not because of the Government.

Metal Congress and Exposition

(Continued from page 549)

strains occur as a result of this and not because of a low work-strengthening rate. That stretcher strains do not occur in freshly cold-worked steel is for the same reason that they do not occur in non-ferrous alloys such as copper and aluminum, namely, because, as it is well known, plastic slip occurs at comparatively low loads. In this connection, differential slip occurs in these metals also, but the depth of the stretcher strains are so extremely shallow that their appearance is referred to merely as a 'slight roughening of the surface.'

"Delayed transitions and transformations of one kind of another are a common occurrence in metals. . . . Such phenomena are explained on the ground that insufficient nuclei are present to afford the necessary starting points. In the case of low carbon steel a slight amount of cold work appears to produce the necessary nuclei from which plastic slip may start."

Railroad and Motor Vehicle

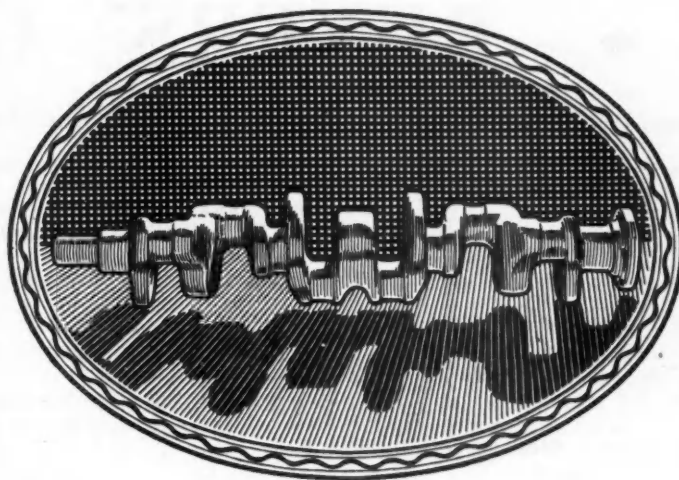
Eisenbahn und Kraftwagen (Railroad and Motor Vehicle). A Report by Oesterreich-

Automotive Industries

isches Kuratorium fuer Wirtschaftlichkeit (Austrian Efficiency Board) on the problem of "Work Division and Cooperation" between Railroad and Motor Vehicle. Published by Julius Springer, Vienna.

IN Austria, the same as in all other more or less industrial countries, the competition between the railroads and the commercial motor vehicle operators has become very keen, and in order to ease the situation the Efficiency Board appointed a Committee on Efficiency in Transportation, which in turn appointed a subcommittee on Cooperation in Transportation. This lat-

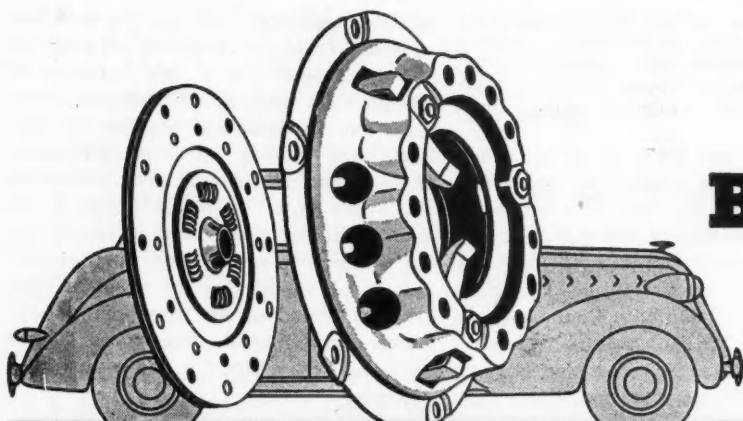
ter subcommittee took up the problem of relief from the situation. It came to the conclusion that a final solution of the problem could be effected only stepwise and in empirical manner by giving both modes of transportation, through proper regulatory measures, the opportunity to bring about a division of activities and cooperation. Proper guidance of their further development would then bring about the solution aimed at by transport policy, which would spell success for both parts and therefore for the country as a whole.



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See Alphabetical List of Advertisers on pages 38-39

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